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The Chemical Age

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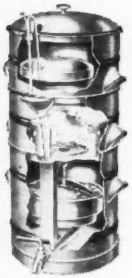

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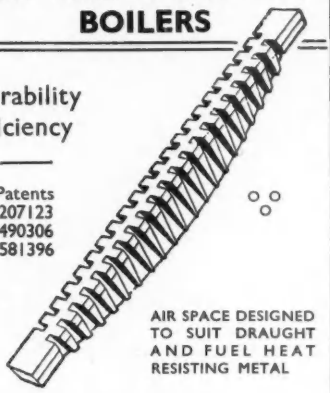

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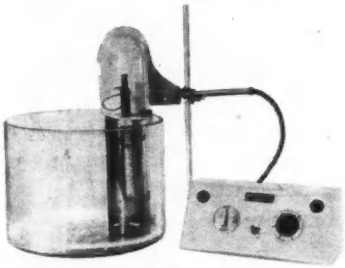

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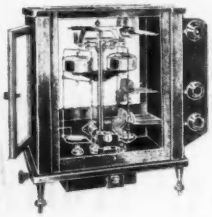

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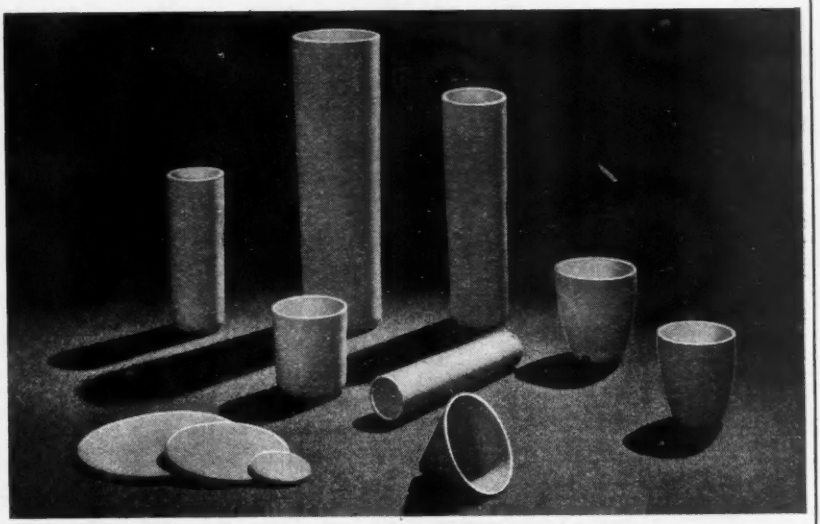

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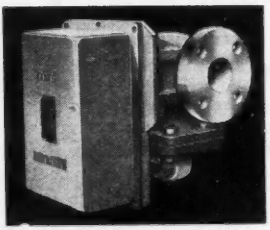

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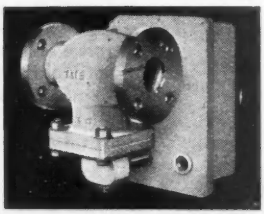

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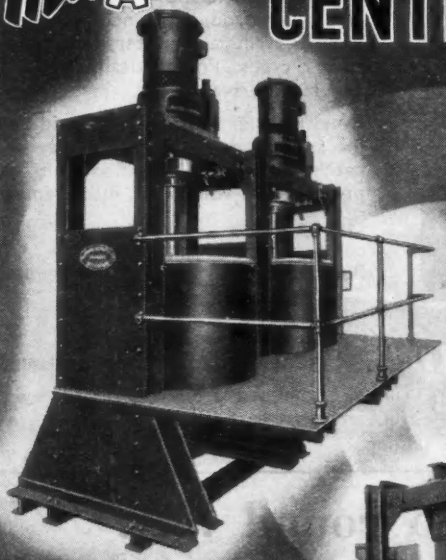

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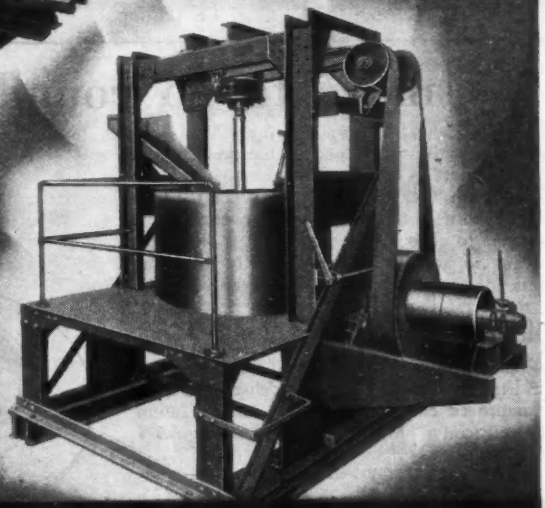

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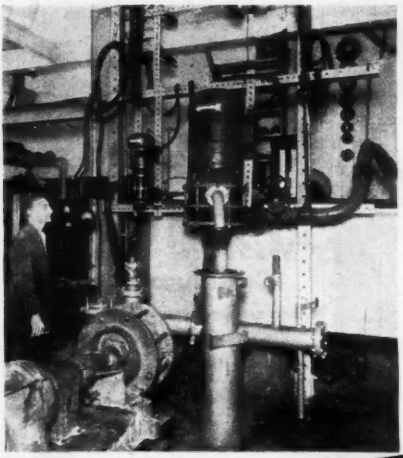

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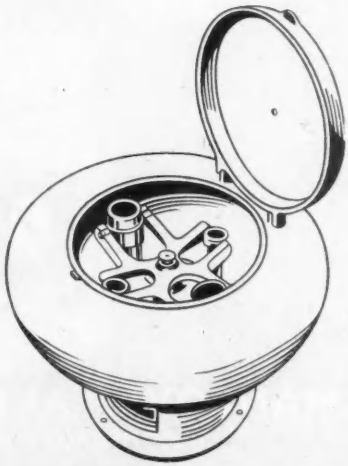

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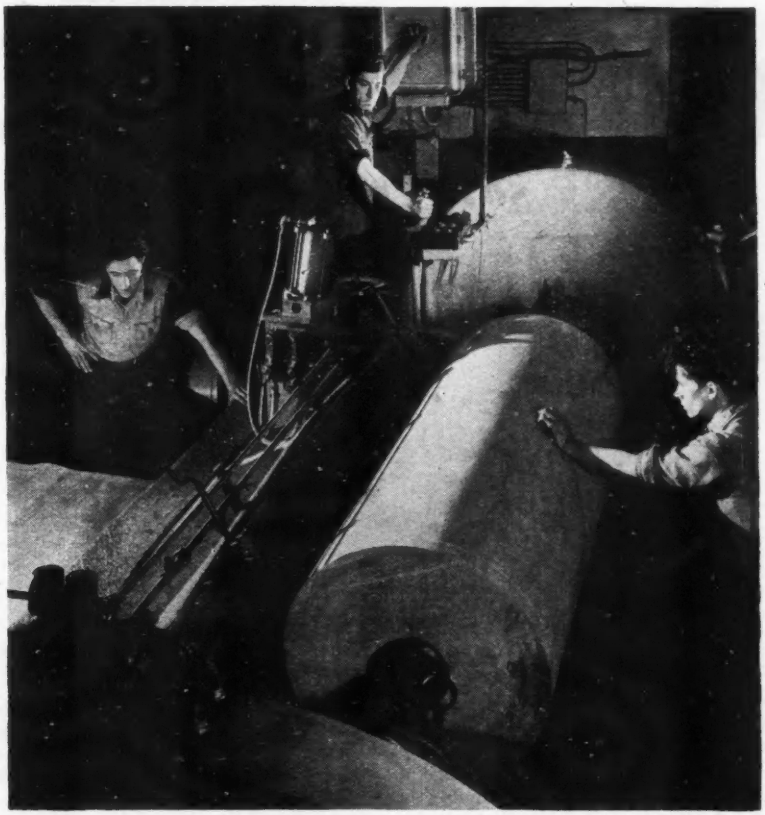

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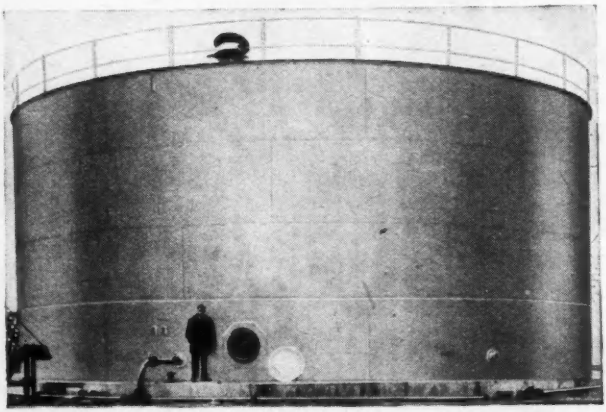

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Volume LXVI **29 March 1952** **Number 1707**

The Future of Rubber

EVEN in the past few years the price of rubber has run true to its own form. It has bounced violently upwards and then bounced back again gently—while the general ascent of prices for other major materials has been steady and unrelenting. In a little over one year the London price has dropped from 69¼d. to 34d. per lb. However, the fall is not as severe as it appears, for until 1950 the London price had remained fairly steady at about 12d. per lb. The sharp jump upwards began with Korea. It is said that the new descent in price is due to the fact that America has stopped stockpiling. While it is true that the stockpiling influence largely created the 1950/51 rise, it is not as true to attribute the fall in price to its removal. There is another and a much more significant influence—that of chemical or synthetic rubber. The production of the synthetic product in America is steadily expanding. In consumption it is probable that a 'point of no return' has now been passed, for today the United States consumption of synthetic rubber is almost twice its consumption of natural rubber. The latest figures show a monthly consumption of 61,000 tons of synthetic compared with 33,000 tons of natural rubber. As recently as 1950, 60,000 tons of the natural product were used each month and 45,000 tons of synthetic rubber.

This definite trend has less than pleasant long-term implications for the sterling area. Malayan rubber has been a dominant dollar-earner. It can be argued that the price of 34d. per lb. or even a lower forward price of about 30d. is far better than the 1947-49 average of just over 12d., but since then the costs of Malayan production have also risen considerably. Moreover, natural production in Malaya must be attractively profitable if present conditions there are to be tolerable for those who must look after the plantations. Anything like a slump in rubber coupled with the strain of life there would almost certainly bring irreparable damage to the Commonwealth's outstanding source of natural rubber. Nevertheless, as has so often happened before, a sharp rise in price of a natural commodity has opened the door wide for the synthetic, chemically produced product.

What would happen to Malaya and particularly to its rubber if in the end the dollar consumption became quite small? Better living conditions for Malayan labour could not materialise and the internal or political situation would become more precarious still. In the event of a more general breakdown in

the international situation the security of Malaya would be far from a predictable certainty. There is a soundly arguable case for the development of synthetic rubber production in the United Kingdom. Alcohol and benzene are the principal raw materials. They can be produced at home. Well over half of the U.S. production of synthetic rubber is the so-called cold GR-S or butadiene-styrene product. Butadiene can be obtained from ethyl alcohol or from butane by-produced in oil cracking; styrene from benzene and ethylene. In fact both the alcohol and the styrene could be based upon ethylene; and in that case benzene would be the only other major raw material required. Sulphur, however, might prove to be the most difficult supply problem if Britain sought to establish large-scale synthetic rubber production. Rubber when finally used is not pure rubber, whether natural or synthetic. Various materials are needed as additives. Sulphur for vulcanisation; accelerators for the sulphur-rubber vulcanisation; and fillers such as carbon black. One of the differences between synthetic GR-S and natural rubber is that the former needs about 40 per cent more accelerator to speed up vulcanisation; and the accelerators commonly used are sulphur-containing compounds, e.g., benzothiazyl disulphide, dithiocarbamates, etc. If natural rubber needs sulphur, synthetic rubber needs more. The intensive development of this type of rubber in the United States has been accompanied with a big increase in the American rubber industry's demand for chemicals. The accelerator requirement has risen sharply. It is one thing to overcome the reduction in sulphur imports by making sulphuric acid from pyrites, anhydrite, and spent oxide; it is a more difficult problem to produce elemental sulphur to meet a new and rising demand.

The production of synthetic rubber here would dovetail neatly with the 'chemicals-from-petroleum' industry. It fits in, too, with post-war expansion in oil refinery capacity. Indeed, it might be said that oil-cracking and aiming at making chemicals from oil are one and the same project; distinction is purely a distinction in degree. We are certainly better equipped as a chemical nation to embark upon synthetic rubber production than we would have been five, ten, or fifteen years ago. Yet to do so must inevitably intensify the present difficulties of Malaya; not to do so may tremendously intensify our own future difficulties should the situation in Malaya deteriorate. A compromise solution to this dilemma seems likely. At some not too distant date a British start in synthetic rubber production must surely be made. It might have no more than a limited target of production, a prototype for ready expansion if our main supplies of the natural product ever became uncertain or cut off. This in any case would be a practical as well as a political compromise since it generally makes for final efficiency if a new industry begins on a relatively small scale.

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Notes & Comments

A Code for Resins

THE synthetic resin industry having developed in a somewhat haphazard manner, it is not surprising that nomenclature trouble has arisen. A diversity of products is manufactured and the consumer has little chance of deducing composition from branded names, still less of assessing likely properties. When data about resin properties are given, the methods of expression are not standardised. This seems oddly in contradiction to one of the major claims of all synthetic products—that they are more consistent in quality and performance than comparable but natural materials. It is to the credit of the Surface Coating Resin Manufacturers' Association that an effort is now being made to classify the numerous synthetic products. Classify, indeed, is a term rejected by the sub-committee set up to deal with this problem—a scheme of codification is preferred. A master code system for each of the different classes of resins has been put forward. Thus, in the alkyd resin class, letters A to E stand for the alcohol used, different two-digit numbers for the various resin acids, and again letters for the modifying fatty acid. Using such a code a 60 per cent solution in xylol of a castor-oil-modified glyceryl phthalate resin of 50 per cent oil length would be describable as Alkyd C20/E50/X60 per cent. The C and the 20 refer to glycerol and phthalic acid respectively; E to castor oil; and X to xylol. This coding system is not intended, of course, to replace branded names but simply to provide constitutional information in a short and standardised manner. Similar code systems are proposed for the phenol-aldehyde and urea resins.

Standardised Description?

DESPITE its growth the synthetic resins industry is still young; despite their wide use today, its products are still fairly new. It is not too late to introduce this scheme, or indeed some other similar scheme, for standardised description. Users and manufacturers alike would soon become accustomed to what at first sight seems complex. Once in general acceptance the code nomenclature will prove itself to be a most beneficial form of technical shorthand. The question of a standardised system for stating such properties as acid value, viscosity, etc., is also being considered. It is to be hoped that this industry will follow the lead being given by its trade association. Confusion in names or terminology can never help the sales of good products; all it can ever achieve is the worst sale of all, the non-repeated sale of an inferior or misplaced product.

Systemic Insecticides

IT is now well known that some of the organo-phosphorus compounds can act as systemic insecticides, i.e. be absorbed by the plant and exercise their toxic effects upon sap-sucking or plant-eating insects from within. A useful period of protection against this type of pest is given but reactions with plant enzymes gradually destroy the toxic compound so that finally only non-toxic derivatives remain in the plant. Both selectivity in insect control and great freedom from re-infestation are made possible by these new systemic insecticides. One of their lesser known effects, however, is their ability to stimulate plant growth, an effect that appears to be quite separate from benefits that might be expected from kills of aphis or red spider. Improved foliage and significant yield increases have been frequently noted with certain crops, e.g. with hops. Far from being in any degree plant-toxic, as might originally have been feared, these compounds have given numerous indications of growth stimulation. It may be expected that there should be some reaction by the plant to their assimilation, for they are not merely carried as inert passengers in the sap stream—there is a gradual chemical association with plant substances. It does not seem reasonable to attribute any growth stimulation to the phosphorus

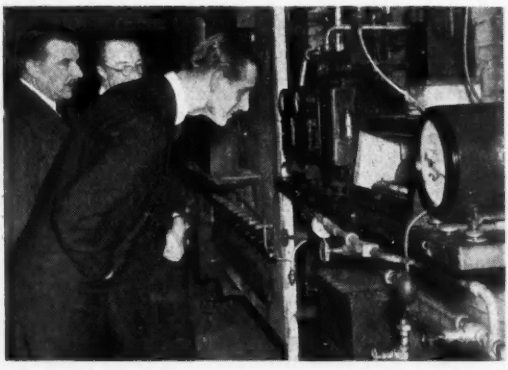
contained in these insecticides for although this element is an important nutrient the quantity involved is far too minute to be of nutritional significance.

Similarities Discovered

SOME light has recently been shed upon this phenomenon. American research workers of the University of Minnesota (M. M. I. Zeid and L. K. Kuthomb, *Journal of Econ. Entomol.*, 1951, **44**, 6), studying the effects of parathion, paroxon, and schradan (or OMPA) when these are translocated within plants, have compared the growth changes brought about to those that follow the use of growth-regulating chemicals like 2,4-D. With both 2,4-D and the organo-phosphorus insecticides there is an increase in the carbohydrate contents of plants. OMPA, the only truly systemic insecticide tested, led to an increase in the nitrate content of leguminous crops, another similarity to the effects of growth-regulating substances. These effects are more marked in the light than in darkness. Is it possible to take the view that organo-phosphorus systemic insecticides can also function as auxins in the plant?

The Housewives' League

THERE have been a number of party-political jibes at the silence of the British Housewives' League since the last General Election, but a letter from Mrs. Winifred M. Sykes, vice-chairman of the League, in the *Sunday Times* of 23 March most alarmingly suggests that, having conquered socialist Ministers of Food, these energetic ladies are now bent upon conquering chemicals. Mrs. Sykes attacks the addition of 'Agene' and calcium to flour and iodine to salt; she also appears to look upon the American practice of adding fluorides to water to reduce teeth decay with considerable trepidation, particularly the fact that a team of British scientists is at present studying this development in the United States. As her letter is signed officially in her capacity as Vice-Chairman of the British Housewives' League, it must be assumed that this body has decided to adopt an anti-chemical front. It is to be hoped that this assumption can be denied. Nobody will deny that some additions of some chemicals to foods have been shown to be unwise. Every case of chemical addition must be considered on its own merits or shortcomings. The peak of fatuity is reached when Mrs. Sykes attacks the addition of iodides to common salt on the grounds that it is contrary to the first principle laid down by the International War Crimes Tribunal for medical experiments on humans, namely that voluntary consent of the human subject is absolutely essential. Are those areas of Britain whose soils are iodine-deficient to revert to what they once were—centres of goitre trouble? Surely a general attack upon all food chemicals—even upon those whose benefits have long been proved—is not the policy of the British Housewives' League?



The Duke of Edinburgh inspecting a densitometer during his visit to the Fuel Research Station, East Greenwich, on 20 March. Next to the Duke is Dr. C. C. Hall, head of the Synthetic Fuel Section, and Dr. A. Parker, Director of Fuel Research

Work of the British Plastics Federation

Standardisation and Test Problems

EXPORTS of British plastics materials and products in 1951 reached a new record value of £19,566,127, compared with £11,941,841 in 1950, and £6,919,564 in 1949. Export tonnage of plastics materials alone rose from 20,707 in 1949 to 37,806 in 1950 and 53,147 in 1951.

This achievement was disclosed in the annual report for 1951 of the chairman and council of The British Plastics Federation at its annual general meeting held in London on 19 March.

New members elected to the federation during the year numbered 27 and included the following:—Plastics Materials Group: Styrene Products, Ltd.; Moulders' Group: George Becker, Ltd.; Fabricator Group: British Insulated Callender's Cables, Ltd., Prodorite, Ltd., Rediweld, Ltd.; Engineers' Group: R. H. Windsor Ltd.; Raw Materials' Group: Coalite & Chemical Products, Ltd. Total membership at 31 December, 1951, was 259.

During the year four standards were published by the British Standards Institution as a result of draft specifications prepared by the technical committees of the federation; six additional draft specifications were completed and forwarded to the BSI; work continued on eight others and was started on six additional specifications and codes of practice including the use of polythene tubes for chemical plant.

In this connection special reference was made to the Glossary of Terms Used in the Plastics Industry (now published as B.S. 1755) which should prove of service to the industry and those using its products, and would, it was hoped, eventually lead to the adoption of a uniform standard of nomenclature.

Problem of Test Temperature

The problem of test temperature had been further discussed on several occasions during the year. At the moment no definite policy had been adopted by the various technical committees since, following a recommendation of the Plastics Industry Standards Committee that the test temperature should be 25° ± 1°C., some committees had used this temperature, but the American Society for Testing Materials now appeared to be using 23° ± 1°C. while those working with PVC materials were more inclined to use 20°C.

United Kingdom delegates to the International Standards Organisation Committee TC/61 which met in New York in September, took the opportunity of raising this matter and it was understood that it had been referred to a working party.

Regular liaison with the Forest Products Research Laboratory had been maintained by the Synthetic Resin Technical Committee. Long-term weathering tests conducted by the laboratory on synthetic resin adhesives were being kept under review and a further set of results of five years' tests had been discussed.

Fire Protection Appointment

As a result of an approach from the Fire Protection Association, Mr. C. Wainwright was appointed by the main technical committee to sit on the chemical committee of the Fire Protection Association to assist them in discussing the question of the risks in the use of plastic materials. Following discussions of this committee and on the advice of Mr. Wainwright a classification of plastics materials according to their fire resistance had been prepared during the year.

While the plastics industry had its own raw material supply problems, the federation during the period under review, received an increasing number of inquiries from manufacturers wishing to replace metal by plastics materials.

Early in the year, efforts were made to improve the supply of steel for drums required by plastics material manufacturers for packing several of their products, particularly for the export market. Detailed requirements of steel for this purpose were collected and the information passed to the Ministry of Supply. As a result of these and similar representations by other organisations, the import duty on drums was removed.

Shortage of phenol which was apparent in 1950 became more acute during the year as demand continued to rise and imports dropped owing to shortages overseas. Owing

to the difficulties in bringing new plant into operation and the effect of sulphur restrictions, production of synthetic phenol did not have an appreciable effect by the end of the year and a gap of approximately 3,000 tons remained in respect of the July/December, 1951, requirements.

Shortage of Resins

Negotiations with the Ministry of Supply, Board of Trade and Ministry of Fuel and Power took place in the autumn owing to the serious shortage of cresol-formaldehyde resins for the production of laminated materials. While the deficiency in phenol could, in due course, be made good by synthetic production, no such solution was available to meet the deficiency in the *meta*-rich grades of cresylic acid. As these resins were particularly required for the production of laminated materials, this had led to serious shortages of these materials which were required for essential purposes.

Immediately prior to the imposition of Government control over supplies of sulphuric acid, the federation submitted to the Board of Trade detailed requirements of this material for use in the plastics industry. Arrangements were subsequently made by the Board for the industry's essential requirements to be met. Supplies had continued to be insufficient to meet all the demands. The possibility of recovering waste sulphuric acid was also receiving attention.

Demand for some types of moulding powder outstripped the supply during the past year. Regular joint meetings were held between the moulders and the moulding powder manufacturers to discuss the position and to consider the statistics of production which were collected by the latter.

By agreement with the Association of British Chemical Manufacturers arrangements were made with the Board of Trade for continued exemption from Key Industry Duty of a number of materials, where the demand in the United Kingdom exceeded the supply.

Following discussions between the federation and the Anglo-American Council on Productivity arrangements were begun for a team from the moulding industry to visit the U.S.A. in the spring of 1952.

Addressing the annual general meeting, the retiring chairman, Mr. P. A. Delafield, said that more and more the federation was being treated as the official body covering the manifold interests of the industry and he had noticed an increasing tendency within the federation for section to co-operate with section and group with group.

Mr. C. S. Dingley (executive director, British Industrial Plastics Ltd.) was elected chairman and Mr. A. E. Skan (managing director, Tufnol Ltd.) vice-chairman for 1952-3. Mr. R. P. Anderson was re-elected honorary treasurer.

New British Standard

DETERMINATION of cadmium in copper-cadmium alloys (electrolytic method) is the subject of B.S. 1825: 1952 which has been published in response to a request for a British Standard method for the determination of cadmium in straight copper-phosphorus-cadmium alloys, as used in the manufacture of trolley and contact wire for electric traction and specified in B.S. 23 'Trolley and Contact Wire for Electric Traction'.

The method is suitable for cadmium contents up to 2 per cent and specifies reagents, recommended methods of sampling and the test procedure.

Copies of this standard may be obtained from the British Standards Institution, Sales Branch, 24 Victoria Street, London, S.W.1 (1s. 6d. post paid).

Increased Benzole Yields

THE journal of the Austrian Society of Chemists, *Oesterreichische Chemiker Zeitung*, contains in its March 1952 number a remarkable article: 'Process for the Increase of Benzole Yields during the High-Temperature Coking of Coal,' by Dr. Ing. Fritz Rosendahl. After a critical survey of the origin and production of benzole hydrocarbons in the coking process, it outlines the physical and chemical reactions taking place in the recovery ovens of the regenerative type, which has almost completely replaced the old beehive oven. The article emphasises the importance of the inner-suction, the differential heating, the cover channel and the adjusters for the purpose of raising the benzole yield and it collects from the best sources of literature the essential details of technical data. The article contains 15 instructive text figures, 6 tables and many valuable references.

The Analytical Chemistry of Potassium

Part I: The Use of Inorganic Reagents (continued)

IN last week's issue the author dealt with a number of the older and more reliable methods for determining potassium through the use of inorganic reagents. This week he discusses other inorganic methods and in future articles will deal with organic and physical methods. The writer has just finished a three-year period of research on the analytical chemistry of potassium.

Silver Cobaltinitrite

This reagent for precipitating potassium as potassium silver cobaltinitrite was first proposed by Burgess and Kamm[49] who claimed that it would detect potassium if present to the extent of 1 part per million. It was used by Robinson and Putnam[50] for the determination of potassium in fresh water. They used a colorimetric finish after treating the precipitate with sulphanilic acid and α-naphthylamine. Klein and Jacobi[51] titrated with ceric sulphate using ferroin as indicator and claimed that the reagent was more sensitive than sodium cobaltinitrite and that the precipitate formed was more constant in composition. Ismail and Harwood[52] came to a similar conclusion when they finished the determination by Volhard titration or by titration with ceric sulphate. Perlira[53] used the reagent for the estimation of potassium in biological specimens. After precipitation, the cobalt was estimated colorimetrically. Kometiani and Dalidze[54] developed a micro method by precipitating as potassium silver cobaltinitrite, converting the silver and cobalt to sulphides, and measuring colorimetrically.

In general the reagent is made up of silver nitrate, sodium cobaltinitrite and sodium nitrite. The precipitate obtained has a composition $K_{1.35}Ag_{1.65}CO(NO_2)_6$[49] but as with the sodium cobaltinitrite, this varies with the ratio potassium: silver in the precipitating solution.

One of the serious drawbacks to the method is that chloride interferes and so must be previously removed.

Other Polynitrite Precipitates

Work involving polynitrite molecules has been extended to the use of reagents where sodium or cobalt are replaced by other metals. Freshly prepared silver cobaltinitrite comes into this class.

Adams, Hall and Bailey[55] recommended zinc cobaltinitrite as a reagent for precipitating potassium. This was prepared by passing nitrogen oxides through a solution containing zinc and cobalt acetates for approximately one hour.

Underwood and Bailey[56] used this precipitation as a qualitative test for potassium, they also mentioned magnesium cobaltinitrite as a qualitative test. This is prepared in a similar way to the zinc cobaltinitrite, the nitrogen oxides being generated by sodium nitrite and dilute sulphuric acid.

Tovarnitzkii and Sergeenko[57] have suggested precipitation with sodium lead cobaltinitrite, but the method is only useful when large quantities of potassium are involved.

Tichomarov and Cholmogorov[58] used a mixture of lead nitrate, copper nitrate and sodium nitrite which gives a precipitate of composition $KCuPb(NO_2)_6$. The method put forward involved samples as large as 25 gm. and was therefore limited in its application.

Later work has been done by Martini and Rizza[5] to find insoluble salts of this type. The composition of the polynitrite is M M′ M″ $(NO_2)_6$ and in the work performed:

M was potassium, caesium or rubidium

M′ was lead, barium, strontium or calcium

M″ was copper, cobalt, nickel, cadmium or zinc. However, no conclusive results were obtained.

The Work of Gaspar-y-Arnal

Gaspar-y-Arnal has produced three reagents for the determination of potassium;

Calcium ferrocyanide[60]: This gives a precipitate with potassium or ammonia of the composition CaM. $Fe(CN)_6$. The precipitate was titrated with potassium permanganate.

A modification by Tananaev and Dshaparidze[61] was to take the solution down to dryness and then extract with alcohol, leaving the potassium precipitate which was then titrated.

A step further was taken by Gaspar-y-Arnal to separate the alkali metals. He claimed that rubidium and caesium are precipitated in aqueous solution, potassium and

ammonia in 50 per cent ethyl alcohol and that lithium and sodium stayed in solution.

This is a valuable contribution since it is difficult to separate potassium from caesium and rubidium and it is surprising that the work has received such little attention.

Uranyl nitrate and sodium chromate[62]: A stoichiometric mixture of these two compounds in solution was the second reagent he produced. This is known to give a precipitate with potassium but little further work has been done.

Ammonium molybdate[63]: A saturated solution of this salt gives a precipitate with potassium when heated. Sodium tungstate is similar but gives a precipitate in the cold. These reagents have only been tentatively put forward and further work on sensitivity and interfering elements is yet to be done.

In a private communication, Mr. R. Belcher, of Birmingham University, has questioned the use of this reagent and has in practice been unable to obtain the reactions described above. These reactions he believed are due to the presence of phosphate which would explain why precipitates are formed.

The use of fluosilicic, fluoboric and fluotitanic acids.

This related family of acids holds promise since with each one a precipitate is obtained with potassium but not with sodium.

Rose[64] worked out a method using fluosilicic acid wherein the insoluble salt is filtered off, dried and weighed. Knop and Wolf[65] modified this procedure by using aniline fluosilicate as the precipitant.

To date fluoboric acid has only been recommended qualitatively[66] and even in this capacity it is not altogether convenient since ammonia must be first removed. However magnesium, lithium and sodium do not interfere.

Fluotitanic acid has been recommended as a qualitative test [67], but further work has yet to be done.

The use of phosphomolybdic acid and phosphotungstic acid

Each of these reagents has been recommended as a potassium precipitant by Treadwell and Hall[68].

With phosphotungstic acid a precipitate of potassium phosphotungstate $K_2O.P_2O_5.12WO_3.9H_2O$ is brought down. This can be filtered off and titrated with caustic soda. Van Slyke and Rieben[69] used the reagent quite successfully for the analysis of biological samples. Folch and Lauren[70] obtained good results on the analysis of blood.

It was found that large amounts of calcium interfere, also that removal of ammonia is necessary in blood analysis. Earlier workers however did not find any interference due to ammonia.

With phosphomolybdic acid, ammonia must always be removed. A method using this acid was put forward for large amounts of potassium by Ilmenev[71].

The method was based on the insolubility of potassium phosphomolybdate $K_3PO_412MoO_3$. The insoluble potassium salt was filtered off, washed and titrated with caustic soda. This procedure is exactly parallel to the estimation of phosphate as ammonium phosphomolybdate.

The use of sodium bismuth thiosulphate

This reagent was proposed originally as a qualitative test by Carnot[72]. Campari[73] later developed a quantitative process based on the fact that potassium bismuth thiosulphate $K_3Bi(S_2O_3)_3$ is insoluble in ethyl alcohol, whereas sodium bismuth thiosulphate is soluble.

However Cuisinier[74] after careful work considered that the method gave high results.

Sodium Cobaltithiosulphate

Celsi[75] used this compound as a precipitant for potassium. He made the reagent up as a mixture of sodium thiosulphate and cobalt nitrate. However, little information is available as to its sensitivity and the effect of interfering elements.

The Use of Zirconium Sulphate

This reagent was put forward by Reed and Withrow[76] who claimed that ammonia, caesium and rubidium did not interfere. On examination however Yajnik and Tandon[77] found that caesium and rubidium were precipitated by this reagent and actually developed a method to estimate these elements using this compound.

One difficulty with this reagent is that it must be freshly prepared since hydrolysis occurs on standing.

Potash Alum— $K_2SO_4.Al_2(SO_4)_3.24\ H_2O$

De la Paule[78] developed a method in which potassium was crystallised out as potash alum. Little information is available concerning interfering elements but one disadvantage of the method is that it is time-consuming.

Estimation of Sodium and Potassium

This has been effected by Szebelledy and

Schick[50] by evaporating the mixed chlorides or sulphates with hydrogen iodide and extracting the sodium iodide with *iso*butanol and ether.

Hegedus[51] further developed this as a micro method by oxidising the potassium iodide with chlorine water to iodate and titrating with thiosulphate in the normal way.

Escolar[52] developed a method of determining the alkali content of mixed chlorides by estimating the chloride as silver chloride. Knowing the weight of the original sample and the number of mols. of alkali metal present, the ratio sodium: potassium can be determined. It must be remembered, however, that since this method is dependent on knowing the chloride concentration exactly, this must be determined with extreme accuracy.

CONCLUSIONS

It can be seen from the foregoing review that there are numerous methods for estimating potassium.

Those methods which have been examined closely have always been found to have some undesirable facet in their make-up. The time taken for an estimation is usually long and often the potassium is precipitated as a compound of variable composition.

However, several methods merit further investigation and any one of these may lead to a rapid and accurate estimation of potassium.

(To be continued)

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Electrolytic Symposium

'ELECTROLYTIC Processes in Chemical and Metallurgical Industry' will be the subject of a two-day symposium to be held in London next month.

An interesting programme has been arranged for the occasion which will be a joint meeting of the London section of the Society of Chemical Industry and the London and South-Eastern Counties Section of the Royal Institute of Chemistry. There will be three sessions held in the large chemistry theatre, University College, Gower Street, W.C.1, on 7-8 April.

On the first day the session will begin at 5.30 p.m. with an introductory address by H. J. T. Ellingham on: 'Principles of Electrolytic Processes.' A discussion on 'Extraction from Fused Salts' will follow with papers by Dr. A. L. Hock (Magnesium Elektron, Ltd.) on 'Magnesium Extraction' and J. Waddington (British Aluminium Co., Ltd.) on 'Aluminium Extraction.'

'Extraction and Refining from Aqueous Salts,' will be the theme of the second session which begins at 4.0 p.m. on the second day. Dr. J. W. Cuthbertson (Tin Research Institute), will deliver a paper on: 'Recent Advances in the Electrolytic Extraction of Manganese,' and Dr. E. S. Hedges (Tin Research Institute), will speak on 'Electrometallurgy of Tin and Its Alloys.'

At the final session which begins at 6.0 p.m., W. S. Wood (Laporte Chemicals, Ltd.), will describe 'The Preparation of Hydrogen Peroxide,' and R. J. Kingdom (Imperial Smelting Corporation) will take as his subject 'The Electrolytic Production of Fluorine.'

Encouraging the Research Worker

Lord Woolton on Scientists & Industry

AN appeal for the wider application of scientific knowledge was made by Lord Woolton, P.C., C.H., Lord President of the Council, in his address to the Parliamentary and Scientific Committee at its meeting held at the House of Commons, London, on Wednesday, 27 February.

Great Britain, said Lord Woolton, despite the many difficulties with which she was confronted to-day, was retaining her lead in the development of fundamental research in the scientific field.

Many circumstances had contributed to the present straitened circumstances of Britain, but one reason, the Lord President felt sure, was failure to make use of, commercially and industrially, the knowledge she possessed.

Greater Acquaintance Urged

He appealed to the management of industrial concerns on the one hand, and to farmers on the other, to make themselves more fully acquainted with the results of recent scientific research. The best could not be got out of scientists by leaving them in splendid and austere isolation. They, too, needed encouragement; they were just human beings; and the best encouragement industrialists could give them was to use the knowledge they had so patiently wrested from the mysteries and secrets of nature.

Need to make the fullest industrial use of scientific and industrial research led on to the question of technical and technological education. It was strange that there should be so much controversy on the subject because the facts were after all so simple. Higher production and higher productivity came from increasing technological knowledge and skill, and these in turn came from employing more and more highly trained technologists and technicians.

There was no question at all that our balance of payments problems and our defence problems at this moment were basically production problems and that our production problems were primarily problems of technology. Here again, if industry would open its mouth wider and ask more loudly and more urgently for more technologists and technicians many remaining doubts and disagreements would be removed and the problem of educating the right people in the right ways would fall into proper perspective.

In America in 1949 the total number of degrees awarded in science and technology was about 110,000. In Great Britain in the same year the number of corresponding degrees, including Higher National Certificates and Higher National Diplomas, was only about 14,000. Even after adjusting for the difference in the size of the labour force in the two countries, American industry now engaged every year three scientifically trained men for every one taken on in British industry.

The American Institute of Management reported that 75 per cent of the presidents of 204 leading industrial companies were graduates, mainly scientists. Lord Woolton wondered what the comparative figure would be in this country. He suspected it would be a great deal lower. However, there was a marked trend in this direction among some of our leading firms. Imperial Chemical Industries, for example, had, in the past 18 months, promoted to be managing directors of Divisions no less than seven heads of research departments. Progressive small firms as well as large were increasingly adopting this line.

Quoting a few examples where advantage was being taken of scientific knowledge, the Lord President referred to the chemical attack being made on the potato eelworm, the experimental tests shortly to be made in this country with the much talked-about Krilium, and the use of sisal juice as a precursor for the synthesis of cortisone.

In conclusion, he asked members of the Houses of Parliament to give research workers the encouragement of their active interest, and that in the activities under Government control an example should be set by using the knowledge at its disposal.

Property Acquired

Glaxo Laboratories Ltd., of Greenford, Middlesex, propose to acquire land and buildings at Montrose, Angus. Adaptation and extension of the premises will be made to carry out the development of new processes for pharmaceutical products, based upon original work done by the company.

Chemistry & Timber Technology

Wide Scope of the Forest Products Research Laboratory

CHEMISTRY plays an important part in the work of the Forest Products Research Laboratory, Princes Risborough, judging by the report 'Forest Products Research, 1950' which has just been published for the Department of Scientific and Industrial Research (HMSO 3s.; U.S.A. 75 cents).

Subjects dealt with in the steadily increasing advisory work were extraordinarily varied. An analysis of the inquiries of the chemistry section, which had a very wide range of subjects, gives some idea not only of the varying day-to-day work carried out but also of the remarkably broad experience in timber technology which had to be brought to it.

In the chemistry section, 341 inquiries were dealt with in the year under review. Of these, 54 were answered by telephone, 260 by letter or report, and 25 in the course of either consultations at the laboratory or visits to industrial firms. Although the bulk of the answers was based on existing knowledge, laboratory work of up to 40 man-hours in some instances was required to provide answers to over 10 per cent of the total inquiries received. In addition, nine inquiries resulted in laboratory work or short-term researches each extending over periods of weeks. In one the results were submitted for publication.

Classification

Subject matter of the inquiries exhibited the usual diversity and was classified under 15 separate headings as follows:—

	No. of Inquiries
Wood components (including exudates and extractives)	33
Chemical products derived from wood	13
Bleaching and finishing of wood and wood products	13
Natural defects (cause and treatment)	21
Stains and degradations by chemical agencies (cause and treatment)	25
Deposits of extraneous origin found in wood	13
Resistance of specific woods towards chemicals	7
Wood taint in foodstuffs, including beverages	7
Chemical utilisation of wood waste	6
Wood pulp and fibreboard	20
Wood/inorganic cement composites	4
Wood/glue composites (including identification of glues)	9
Wood/metal composites (including metallic corrosion caused by wood and its prevention)	30
Selection and treatment of woods for specific purposes where chemical considerations were involved	105
Miscellaneous	35
Total	341

In the largest group of 105 inquiries, specific uses fell under 27 separate sub-headings, which included:

Laboratory bench tops; cooling towers; filter press frames, chemical-resistant floors; grids for gas-scrubbing towers; lids for boiling pans; linings for pickling tanks; dye and glue vats; packing cases for foodstuffs; paddles and stirrers; pipelines for corrosive chemicals; tanks and vats; and tanning drums.

Fundamental Work on Analysis

During the year under review it had been possible to devote more attention to fundamental work on wood analysis and an investigation on certain aspects of the determination of holocellulose had been begun.

The term 'holocellulose' was originally intended to describe the total polysaccharide fraction of the wood cell wall. It had been established by researches carried out in Germany, the U.S.A. and elsewhere over the past 15 to 20 years that, by the use of relatively mild treatments, wood could be delignified so as to yield an end-product consisting substantially of polysaccharides and representing a much higher percentage of the weight of original wood substance than the cellulose as determined by the time-honoured procedure of Cross and Bevan.

In this modern work, delignification had been effected by repeated treatments of wood with chlorine dioxide and/or chlorine followed by extraction with alcoholic solutions of organic bases instead of the aqueous solutions of inorganic bases used in the past. The advent of sodium chlorite in commercial quantities had also led to the use of this chemical as a delignifying agent since, under acid conditions, it gives rise to chlorine dioxide. In the presence of a suitable buffer to control *p*H, sodium chlorite could be used without subsequent extraction with an alkali to effect virtually complete delignification.

Complete delignification of wood could

not, apparently, be achieved by any of these without bringing about, at the same time, some degradation and even loss of polysaccharides. An extensive series of orientating experiments using beech and spruce woods and buffered solutions of sodium chlorite at different temperatures indicated that at least two phases or stages were involved in the delignification of wood by buffered sodium chlorite.

Modifications Formed

In the course of the reaction or reactions two modifications of lignin were formed. One modification was soluble in the buffered chlorite solution and was thereby removed from the wood. The other was insoluble and was therefore retained in the holocellulose residue along with any unmodified lignin which might remain. This second modification of lignin was, however, soluble in the sulphuric acid used in the conventional lignin determination. Results so far obtained suggested that, under prolonged action of chlorine dioxide at 50°C., the acid-soluble modification of lignin was transformed into the other modification which was soluble in buffered chlorite solution.

Additional evidence concerning the chemical modification of lignin by buffered sodium chlorite was derived from the colour of the lignin obtained from the wood at various stages of delignification. Further and more detailed investigation was in progress.

Continued work on the sapogenin obtained on hydrolysis of the saponin of morabukea had confirmed its identity as oleanolic acid, a triterpene known to occur in combination in other saponins. The preparation of 200 grams of oleanolic acid was undertaken for the National Institute of Medical Research, using morabukea heartwood as a source. The overall yields of saponin and of oleanolic acid were 4.3 per cent and 0.78 per cent by weight of oven-dry original wood respectively.

Information obtained from a trade source indicated that the yield of saponin from the heartwood of either morabukea or mora was very low compared with the yield obtained from current commercial sources of saponin powder. It would therefore appear that production of saponin from these woods might not be commercially feasible unless a profitable outlet could be found for the fibrous residue remaining after extraction.

In an endeavour to meet problems of this sort, the laboratory had drawn up, on behalf of the Colonial Products Research Council, a programme of experimental work whereby the suitability of secondary Colonial timbers for the production of fibreboards would be assessed. The principal items of equipment for making fibreboard on a laboratory scale had now been installed and a limited amount of exploratory experimental work had been carried out.

Commercial possibilities of the tannin of 'Rhodesian teak' (*Baikiaea plurijuga*) with respect to the leather industry were examined some 18 years ago, when it was found that an extract containing 65 per cent of tannin yielded leather of satisfactory quality in every respect except colour. The leather produced had a strong reddish colour and attempts at that time to decolorise the wood extract failed.

On extraction with acetone, the wood used in current investigations yielded 8.6 per cent of tannin and 9.3 per cent of dark red phlobaphene. The phlobaphene fraction was precipitated by pouring the concentrated extract into twice its volume of water and the tannin fraction was recovered from the liquor, after filtration, by extraction with ethyl acetate. On evaporation of the solvent, the tannin fraction was obtained as a pale reddish-brown powder, which on analysis by the hide powder method, was found to contain 77.7 per cent of tannin and 5.5 per cent soluble non-tannin. Supplies of a few lb. of tanning and phlobaphenes were prepared for further investigation.

Substitutes Hard to Find

Demand for timbers to replace traditional species now in restricted supply, is nowhere more apparent than in the chemical industry. Adequate substitutes for the pitch pine, southern cypress, Douglas fir and Californian redwood formerly used have been hard to find and, in some circumstances, impossible.

In this connection two members of the chemistry section attended a conference at Birmingham arranged by the Society of Chemical Industry on Materials of Construction in the Chemical Industry. An exhibit was prepared for this conference of samples of traditional vat-making timbers, and a paper was presented on the use of timber in the chemical industry.

From the discussion evoked it was found that members of the industry had formed a good opinion of such timbers as doussié.

locust, ekki, pyinkado, greenheart and purpleheart when used in plant construction. Ekki was cited as being good for severe duties involving contact with hot acid, and one firm cited purpleheart as 'the most generally satisfactory all-round wood so far encountered', for use in contact with solutions containing such chemicals as acids, alkalis and oxidising agents. The paper and the discussion have been published in full.

Resistance of specific woods to the action of chemicals such as dilute solutions of non-oxidising acids was difficult to assess by laboratory tests. In vat work, for example, it was well known that skill in fabrication was at least as important as the choice of timber. Timbers nevertheless varied in their intrinsic resistance to acids and this had been shown to depend on such constitutional factors as (1) a high α-cellulose content, (2) a high lignin content, and (3) a low pentosan content. By analysing a given wood, adding the percentage α-cellulose and lignin contents and subtracting the total pentosan content from this sum, a numerical index of intrinsic acid-resistance was obtained.

Such an index could, however, only be a rough guide to the selection of woods for vat construction since other factors such as bulk density, permeability to liquids, straightness of grain, natural durability towards fungal decay, the proportion and nature of minor components, shrinking and swelling characteristics, all had to be taken into account.

Metal Corrosion Inquiries

Inquiries continued to be received on the corrosion of metals in wood/metal assemblies such as occur in boats, automobile bodies, metal-faced cabinets, and so on. Aluminium and its alloys have figured prominently among the 30 dealt with in the course of the year. Few if any woods induced specific chemical attack on aluminium but it was frequently overlooked that, when in a moist condition, all woods acquired the properties of electrolytes. From observations made in the laboratory over a period of years it had been established that moist wood was also a somewhat complex buffer system, the *p*H of which varied from approximately 3.0 to approximately 10.3 according to species.

It was known that aluminium and some of its alloys corroded at all *p*H's although the rate of corrosion was minimum between *p*H 5.0 and *p*H 7.0. When the wood of a composite structure including aluminium was relatively dry, corrosion of the metal would be slight or non-existent. The risk of corrosion occurred when the wood acquired a moisture content in excess of approximately 18 to 20 per cent. For such wet conditions selection of woods according to the *p*H which they engendered provided one but by no means the best method of retarding corrosion.

Other Causative Factors

Where aluminium was concerned, it was important to note that corrosion could be accelerated by factors other than *p*H as such. For example, differences in pressure at various parts of the metal surface in contact with a porous material like wood had been suspected of causing corrosion of the pitting type. Since aluminium happened to be anodic to several other common metals it was very liable to corrosion by galvanic action when incorporated in composite structures involving wood and other metals. Attachment of aluminium to wood by steel or brass screws could thus be a cause of serious corrosion of the aluminium in structures exposed to the weather or to damp conditions indoors.

General conditions governing the use of aluminium and its alloys in association with timber had been discussed with technical representatives of the Aluminium Development Corporation and some general recommendations made, based on laboratory observations.

Chemical effects of weathering on wood in normal and polluted atmospheres were examined. It was found that normal weathering was frequently accelerated by polluted atmospheres in large cities and chemical plants.

Traces of sulphur dioxide, acting either alone or in association with ammonia over prolonged periods at ordinary atmospheric temperatures, induced a peculiar effect on wood. Exposed surfaces gradually acquired a woolly appearance and tufts of fibres were easily flaked or rubbed off. The condition was first observed at the laboratory some years ago in samples taken from the structural timbers of oast houses which had been exposed to the sulphurous fumes from coke fires. The samples had retained detectable amounts of sulphur and ammonia as acid

ammonium sulphate and the superficial woolliness was accounted for by the delignifying action of acid ammonium sulphite.

Since most of the lignin in wood normally occurred in the middle lamellar regions of the cell walls, chemical degradation or removal of lignin resulted in separation of the cells (defibration). Under some circumstances the action of sulphurous fumes was progressive and could lead to serious deterioration in the strength properties of timbers.

Important work was carried out on the classification of adhesives and agreement had been reached by the Composite Wood Corresponding Committee of the Commonwealth Conference Standing Committee on Forest Products. Adhesives were divided into three groups as follows:—

Group I—Weather-proof (phenolics, resorcinols and melamines). Group II—Moisture-resistant (*a*, mould-proof: normal and fortified urea resins, heavily extended phenolic glues; *b*, mould-susceptible: casein, soya, blood, heavily extended urea resins). Group III—Interior adhesives (animal, starch, polyvinyl emulsions).

Model Safety Rules

Second Part Published by the ABCM

THE second part of 'Model Safety Rules for Use in Chemical Works' was published on 24 March and copies will be available from the publishers, The Association of British Chemical Manufacturers, 166 Piccadilly, London, W.1, after 1 April. The price is 25s., post free, and a remittance must be sent with the order.

'Model Safety Rules for Use in Chemical Works' is divided into two parts and the third edition of Part I—Model Rules—was issued in May, 1947. Supplement 1, issued in October, 1950, covering the Factories Act, 1948, and bringing the Model Rules up-to-date is incorporated in the latest version.

Part II, which has just been published, is entitled 'Detailed Instructions' and completes the project which was first begun in 1928. The first section of this part was issued in provisional form in 1930, but only since the war has it been possible to return to the task of collecting and correlating the mass of information involved. Soon after the war ended the Council of the ABCM appointed a new Works Safety Committee to revive the Association's safety activities, with the object of taking account of the far-reaching advances in chemical technology that had been made during the previous ten years. The Council regarded it as essential that safe working conditions should keep pace with these advances and revision of Parts I and II of the Rules was given first priority. The publication of Part II completes the task.

So far as is known there is no comparable book in English dealing specifically with chemical works and setting out in such detail essential safety precautions, how they can best be arranged and where necessary information can be obtained. The Manufacturing Chemists' Association, Inc., of Washington, D.C., however, from time to time issues Chemical Safety Data Sheets and these are designed for collection in a loose leaf binder. In our view the American method of dealing with all aspects of the one chemical is much to be preferred from the point of view of the production worker. Furthermore, there is lots to be said for the loose leaf system when a book takes six years to prepare.

The Committee, in view of the wide field it had to cover and in view of the fact that they had nothing on which to build, expected that there would be omissions or other causes for criticism, but these do not seem to be numerous, or too serious. As a matter of fact one of the most serious criticisms which can be made is that the use of the decimal system for indexing not only was unnecessary but actually makes the search more difficult. To have an index of 46 pages for 236 pages of text is quite absurd.

Closer Liaison Sought

The Scottish Council (Development and Industry) is seeking a closer liaison between English groups engaged in the industrial development of atomic energy and Scottish engineering firms. Dr. J. W. M'David, until recently chairman of Nobel Division, I.C.I. representing the Council, is to meet atomic scientists and engineers in London in early April to discuss methods whereby Scottish firms may share more extensively in this development. He is expected to survey potential development on the engineering side, with emphasis on opportunities for expansion in Scotland.

Wisdom of Long-term Planning

Expanding Operations of the Celanese Corporation of America

A YEAR of constructive accomplishment is recorded in the report for 1951 of the Celanese Corporation of America. Developments made it increasingly apparent that the long-term programme of expansion through affiliates in other countries, which was initiated in 1946 with the construction in Mexico of an acetate filament yarn plant, was proving beneficial to the continued growth of the corporation.

Operations at the Chemcel plant in Bishop, Texas, were maintained at record levels during most of 1951 as a result of peak demands for organic chemicals from all sections of the nation's economy. Besides providing an important part of the company's requirements for chemicals used in its cellulose acetate yarn and fibre products, the plant furnished nearly 50,000,000 lb. of chemicals to users directly connected with the defence effort.

Improved operations and installation of additional facilities at Chemcel resulted in an increase in total output representing a percentage increase in dollar volume of more than 50 per cent. Acetic acid, acetaldehyde, acetone, formaldehyde and methanol were continued as major production items, and increased production of higher alcohols and glycols was attained as a result of process improvement programmes.

Produce Chemicals for Defence

Construction was begun on an additional unit of the Chemcel plant, scheduled for completion early in 1952. This unit will produce a substantial volume of chemicals essential to the defence programme, such as trioxane, as well as providing a major increase in the production of flake paraformaldehyde.

Movement of chemicals in bulk by barge or tanker continued on an expanded scale. In May, the company began shipping a number of chemicals by barge up the Mississippi to a bulk terminal in Chicago. Storage of chemicals at this central midwestern point allows fast service to nearby customers via tank truck and tank car delivery, and also reduces transportation costs as a result of barge movement.

In the plastics division production capacity for acetate film and sheeting was increased by additional installations, and further expansion was expected to be completed in the first quarter of 1952. Investigations into the packaging of produce and other food products in acetate film, was expected to lead to widening markets for this material.

A broad programme of research was continued in all phases of the company's activities, comprising cellulose, cellulose compounds and industrial chemicals, yarns, plastics and related chemicals. A comprehensive range of studies of textiles was initiated in a new research section of the Summit Laboratories. Methods and process improvements developed in the research laboratories at Clarkwood, Texas, will be used in the new chemical plants now under construction.

Canadian Three-Phase Programme

One of the corporation's most important foreign affiliates was Canada, where a three-phase programme of development was being carried out. Columbia Cellulose Company, Ltd., completed the first stage of its high-alpha cellulose plant at Prince Rupert in British Columbia.

Construction of the petro-chemical and chemical yarn and fibre plant at Edmonton, Alberta, by the Canadian Chemical Company, Ltd., was begun in July, 1951, and was expected to be completed by the end of 1952.

The plant would comprise three processing sections—chemicals, cellulose acetate and acetate filament yarn and staple fibre. Industrial organic chemicals would be produced by processes based on the oxidation of hydrocarbons—liquefied petroleum gases—pioneered at the Chemcel plant.

Acetic acid produced in the chemical section would be combined in the second section with purified cellulose from Columbia Cellulose Co., Ltd., to make cellulose acetate. In the third section the cellulose acetate would be manufactured into acetate staple fibre and filament yarn.

Plans of the Celgar Development Co., Ltd., which were announced at the end of the year, for an integrated forest

industry in the Arrow Lakes district of British Columbia, constitute the third phase of the Canadian development programme.

Development was estimated to cost $65,000,000, but this amount might be increased.

Plant construction in the U.S.A. reached its final phase, all the major projects at present contemplated being either substantially completed or brought forward to an advanced stage. By the addition of an acetate staple fibre unit to the Celriver plant and enlargement of other sections, a completely modern and balanced plant had been achieved.

The other principal domestic plant development was the commencement of construction of a second petro-chemical plant near Pampa, adjacent to the rich petroleum fields, with an abundant supply of natural gas, in the Texas Panhandle.

With its completion, which was scheduled for the second quarter of 1952, the corporation would not only greatly augment its supplies of basic chemicals for use in making yarns and fibres, but would also add substantially to its volume of organic chemicals for sale to industry.

Fluorescence Quenching

RIC Lecture at Oxford

FLUORESCENCE quenching was the subject of a lecture by Dr. E. J. Bowen, F.R.S., at a joint meeting between the London and South-Eastern Counties Section of the Royal Institute of Chemistry and the Alembic Club, at the Physical Chemistry Laboratory, Oxford University, on 28 January, with Dr. L. J. Goldsworthy (president of the Alembic Club) in the chair.

The theme of this lecture was the reason why some molecules fluoresce and others do not. Isolated atoms, when excited, always return to the ground state by re-emission of the absorbed light, but excited molecules, even when isolated, usually lose their energy in other ways. The relations between the phenomena of resonance radiation, Raman radiation, and fluorescence were interpreted by means of potential energy diagrams, and the possibility of energy degradation to heat by the crossing of potential energy curves was pointed out.

Two other mechanisms whereby fluorescent power is lost were also discussed—dissociation and electron-transfer. In a dissociation process the electronic energy is converted into translational energy of separation of the products. Electron-transfer processes are characteristic of the coloured ions of the transitional metals, sometimes leading to permanent photochemical change. In the greater number of cases however it seems that the electron-transfer process is rapidly reversed by a thermal reaction, so that photochemical change is not detectable but nevertheless has occurred and has prevented energy emission as fluorescence.

Triplet Levels of Molecules

A recent development of the concept of electronic energy degradation by crossing of potential energy curves has been the recognition of triplet levels of molecules which are responsible for long-life luminescence effects, particularly at low temperatures and for molecules isolated in glassy materials. Some molecules such as nitro-compounds or pyridine can never be brought to fluoresce; these seem to change from the excited level reached on light absorption by a spontaneous intra-molecular process to a triplet level. Triplet levels show phosphorescence at low temperatures but pass to the ground level without radiating at higher temperatures. Quenching by collision between an excited molecule and an unexcited one often occurs through the production of triplet levels, though electron-transfer is common.

Recent work has shown that in some systems of fluorescent molecules, resonance transfer of energy can occur from an excited molecule to an unexcited one, sometimes over distances of many molecular diameters. As the result of such transfer polarised fluorescence become depolarised, and in other instances the transferred energy may be either degraded or re-emitted as a longer-wave fluorescence characteristic of the molecule receiving it.

Another form of loss of fluorescent power occurs where molecular interaction occurs in a solution between a fluorescent substance in its unexcited state and another substance to give a compound which internally degrades electronic energy. Here the effective light absorption for fluorescence is reduced, and the quenching observed is not accompanied as in all other cases by a reduction in the measurable mean life before radiation; it is also generally associated with a negative temperature coefficient of quenching.

Some Recent Developments in India

(*From Our Own Correspondent*)

INDIA is making a bid to catch up with pioneers in the field of atomic research like England and America, by starting production of radioactive isotopes. The policy of pursuing the peaceful applications of atomic energy was laid out in the Indian Parliament early in 1950 by the Prime Minister, and the Chairman of the Indian Atomic Energy Commission, Dr. H. J. Bhaba, announced recently that a high-powered neutron generator would be established this year at the Tata Institute of Fundamental Research in Bombay.

This unit will produce radioactive isotopes and distribute them in the country for research and radiotherapy. The Board of Research on Atomic Energy, which is an advisory body to the Indian Atomic Energy Commission, has drawn up a research programme to be carried out at twelve research institutions and universities in India, and has recommended a total grant of Rs. 3,650,000. This programme embraces chemistry, nuclear physics, cosmic ray and cancer research.

* * *

THE rendering of technical assistance to under-developed countries is the keynote of the policy pursued by many advanced countries. India is mainly getting technical help from the British Commonwealth and the United States, and of the eight experts assigned to Uttar Pradesh, India, under the Point Four Aid Programme, three have arrived, while the rest are expected shortly. These experts will work under the auspices of the FAO and render active assistance and advice in an effort to speed up technological development and rapid industrialisation of the country.

Apart from the Commonwealth and the United States, there is also evidence of an increasing interest among other nations in rendering such technical help as they can to India. Sweden, which has strong trade ties with India, is reported to be willing to supply capital equipment and technical know-how. According to the Swedish Minister in India, a large number of Swedish technicians are already in India and his country would be willing to send more experts to train Indian personnel.

THE fertiliser factory at Sindri, the largest in Asia and one of the biggest in the world, was formerly declared open on 4 March, 1952, by the Prime Minister of India, Mr. Nehru. The factory, which went into production last October, is designed to produce about 1,000 tons of ammonium sulphate per day. As Nehru pulled the lever, a trainload of sulphate steamed out of the yard. The factory has an authorised capital of £25,000,000 and is to be run as a private limited company—Sindri Fertilisers and Chemicals Ltd.—with a nominee of the the Ministry of Works, Production and Supply as the chairman of the Board of Directors.

* * *

ON the advice of the Indian Tariff Board, the Government of India is to grant protection to some industries up to 31 December, 1952. The chemical industries which come under this category are: glucose, calcium chloride, sodium sulphite, sodium bisulphite, sodium thiosulphate, oleic and stearic acids. Besides these industries, the alloy, tool and special steel, ferro-silicon, non-ferrous metal, grinding wheel and battery industries are also entitled to protection.

* * *

THE foundation stone for the main building of the Indian Institute of Technology at Hijli, West Bengal, was laid on 3 March, 1952, by the Indian Prime Minister. The Institute is the first of four planned to train technical personnel for India's various industries and projects. The Institute has already started functioning with a nucleus of students and when completed is expected to provide facilities for more than 1,300 students in chemical, electrical and mechanical engineering and technology, and for post-graduate courses up to 300 graduates. Three eminent foreign professors have been made available to the institute by UNESCO.

Tungsten Production Doubled

Canada's largest tungsten mine, Salmo, in British Columbia, is expected to double production in the spring. The present 250-ton mill being operated for the Canadian Government by the owners, Canadian Exploration, will process 500 tons of ore daily.

Developing Latent Talent

Training Foremen for Dunlop

PROBLEMS of finding a future supply of personnel suitable to become charge hands, foremen, and departmental managers has become increasingly difficult and in order to tackle this matter the Dunlop Rubber Company, Ltd. has initiated a special training scheme at its general rubber goods division, Cambridge Street, Manchester. A chance to visit the centre and see work in progress was afforded to members of the Press on 24 March.

Attend One Day a Week

All boys reaching the age of 16 attend the centre one day a week with pay until they are 18. The number now in attendance is 16 and a supervisory course is being taken by 20 others.

During the two years instruction is given in nine subjects: rubber; textiles; drawing; practical engineering; time and motion study; simple costing; coal, steam, and power; safety; factory welfare and hygiene.

Practical work is done in an engineering shop, a blacksmith's shop and on a model rubber plant. Students on this course are also studying foremanship at the Manchester College of Technology.

The engineering section is well equipped with shaping, milling and drilling machines, lathes and so on, and the boys were seen making dies and moulds as used in the rubber industry. It is not intended to turn them into engineers, but rather to develop the synchronisation of hand and brain, to teach an appreciation of the 'feel' of metals, and by the handling of such different materials as brass, aluminium, iron and steel, to impress on them the skill and time needed to make equipment for industry and the value of plant—particularly in connection with rubber processing.

A simple course of 'motion study' to develop an understanding of planning for the commencement of operations, and a simplified form of accountancy which develops an appreciation of the costs of running a department are included in the training scheme.

There are no examinations, but quarterly reports on a boy's progress are made by the instructors, who are all members of the company keen on imparting their technical knowledge to others in its simplest form.

During the last 50 years the contribution of the chemist to rubber technology has become of increasing importance and the use of rubber rods, sheets, pipes and fittings in the chemical industry has long been established. While in Manchester the Press party had an opportunity of visiting the chemical plant factory and seeing some of the wide variety of applications of rubber, ebonite and PVC linings. Examples included: a 750-gallon tank lined with soft rubber for the transport of HCl by road; conical reaction vessels to withstand brine at 80° C.; pickling tanks; 4,000 gallon storage vessel for mineral acid; lining of coal shutes for abrasion resistance; and various uses of neoprene, butyl, and silicone rubber.

One unusual item noticed was an example of white ebonite.

Testing of rubber linings was also demonstrated. This was carried out by the dry spark test after cure to detect pinholes or other paths to the metal. The operator used a long flexible wire as a probe and the whole surface of the lining was searched for signs of weak seams, perforations or other defects likely to reduce the protective life of the lining. A high frequency low current discharge of the order of 20,000 volts, giving a spark approximately 1¼ in. long is usually employed.

An interesting and new application of rubber was seen in the diagrams of a reservoir in the north-east of England.

Hair line cracks have appeared in the reservoir caused by underground workings in the neighbourhood, and various forms of filling have proved unsuccessful to prevent leakage. The reservoir, which is 750 ft. long by 300 ft. wide and 20 ft. deep is now being lined with rubber plugging to the walls and laying it on the base.

Work will be carried out in sections, and is expected to take about four years to complete, will require 250 tons of rubber and cost approximately £250,000. Estimated 'life' is 50-60 years.

International Nickel Records

Many new records were established by the International Nickel Company of Canada in 1951. Net sales amounted to $286,785,241 ($228,107,346) and net earnings of the company and its subsidiaries were $62,875,571 ($48,765,849). Dividend of $2.60 ($2.00 for 1950), per share was the highest for 14 years.

The Chemist's Bookshelf

THE NATIONAL FORMULARY, 1952. The British Medical Association and The Pharmaceutical Press. London. 1952. Pp. 196. 4s. 6d. (interleaved 7s. 6d.).

The first edition of the National Formulary, which was published in 1949, has been completely revised by a Joint Formulary Committee representing the British Medical Association, the Pharmaceutical Society, the Royal College of Physicians, the Ministry of Health and the Forces medical services. It has not only been amended in the light of experience but it has been enlarged by some 68 pages and has gained considerably in the process. Without a doubt it will be welcomed by the prescribing physician and the pharmacist.

The new Formulary will be received by chemists by 1 April, by doctors by 1 May and the operative date for N.H.S. purposes will be 1 June.

As in the first edition, information more appropriately obtained from textbooks or reference works has been excluded but a number of new and extremely helpful material has been added. One improvement has been the enlarging of the 'Notes for Prescribers' and new monographs have been added on first aid treatment for poisoning, vitamins and vitamin preparations, analgesic drugs, antacids, antibiotics, antihistamine drugs, expectorants and haematinics. A new section, a Pharmacological Classification of the preparations listed, has been added, as has a table of doses of potent doses. Both of these should be of great value to the prescriber. The general section of the formulary has been thoroughly revised and enlarged as has the list of proprietory equivalents. In the latter a distinction has been made between alternatives which are practically identical and those which are analogous in effect.

The commercial practice of issuing the same medicinal substances under a variety of proprietary names is said to have caused many difficulties. The General Medical Council, therefore, approved non-proprietary names which may be used freely by manufacturers and expressed the hope that these names would be generally adopted and used in prescribing. A list of these names and of certain other B.P. and B.P.C. names has been included, together with other names used for the same substances.

An important innovation is the introduction of English headings to the subsections of the Formulary. The use of English headings leads to a more rational grouping, and although it was considered inopportune to use these as the main headings in the present edition, the committee have stated that this may well be a desirable policy in the future. —E.A.R.

COOLING TOWERS. By J. Jackson. Butterworth's Scientific Publications, London. Pp. 104, 331 figures. 21s. 6d.

In this little book, which is published in association with Imperial Chemical Industries, Ltd., the author has provided us with a discussion, largely mathematical, of the design and mechanism of cooling towers. Natural-draught and atmospheric open towers do not lend themselves at present to mathematical analysis; their design, the author admits, is very much of a trade secret. This is the only case, of course, in which practice has run in advance of theory. This book, therefore, is concerned with mechanical-draught towers. I.C.I. possess many cooling towers (not uniformly efficient, we gather) and therefore asked the author of this book to make a study of these towers.

By using the Merkel total-heat conception, the author has found that marked improvement could be made and he has embodied his conclusions in this very useful book. He describes the various types of water-cooling tower and gives the general theory of the mechanical-draught tower, based on the conception that the rate of heat transfer from water to cooling air is the product of the transfer coefficient the area available for transfer and the 'mean

driving force'. The difficulties of applying the total heat theory to the design of mechanical-draught towers are squarely faced and it is shown that the reason for unsatisfactory performance is often the lack of appreciation of experimental work and of the economic factors involved, together with the difficulty of carrying out the necessary tests. The author goes a long way in showing how the experimental results can be obtained and applied.

The data that have been thus obtained are applied also to gas-cooling towers, a process that is the reverse of that occurring in water-cooling towers. The calculations given are illustrated by examples, and a good many practical details are added. Finally, a short concluding chapter contains an account of a complete alternative method of design of both water- and gas-cooling towers by the use of transfer units, and in this chapter a simplified form of the transfer-unit system is outlined followed by a discussion of the application of this theory to design. Appendices deal with the derivation of the total-heat equation, with wet-bulb temperatures and meteorological data, with physical data, economic considerations, the cost of cooling water and economic factors.

This is very much a book for the specialist, but one which should be on the shelves of everyone interested in the subject—designers and users of towers alike.—G.E.F.

Information & Industry

Conference Proves Successful

THE conference on 'Information Services and Industry', organised by the Industrial Research Committee of the Federation of British Industries in collaboration with the Association of Special Libraries and Information Bureaux, held at Church House, Westminster, on 18 March proved highly successful, there being over 100 interested parties present. Three papers were read at the morning session and in the afternoon a number of the information departments of important companies, covering a wide range of industries, were visited.

In his paper entitled 'Information and Industry', Sir Alfred Egerton, F.R.S., head of the Department of Chemical Engineering and Applied Chemistry, Imperial College of Science and Technology, London, compared the sources of information of the nineteenth century with those of to-day. He said that the scientific profession was served better than any other so far as journals were concerned. It had been estimated recently that there were 334 important journals in the world serving physics and chemistry alone. He recommended that the main sources of information should not be too diversified and to this end it was undesirable that new journals should be started if the existing ones were satisfactory and serving their purpose. This has been pointed out at the Scientific Information Conference in 1948 when it was stated that the conference was anxious to induce editors of journals to collaborate in obtaining a higher standard of technical journal.

More Co-operation Needed

Dr. J. H. Chesters, of the United Steel Companies, Ltd., and Dr. J. Farquharson, Beecham Research Laboratories Ltd., then spoke on 'The Practical Value of the Information Service'. Dr. Chesters particularly stressed the reticence on the part of many organisations to share research and other information and he suggested that there should be more give and take in order that more might be achieved. Personal experience of his company's information department was given by Dr. Farquharson and the duties of information officers were summarised, the essential service being the dissemination of articles of particular interest to those persons concerned.

The special services which ASLIB rendered to industry were then discussed by Mr. L. Wilson, director of ASLIB. The Association was, he said, probably more essential to the small firm than to large organisations with their own information services or libraries. Among its special services he mentioned the panel of translators with subject qualifications and also a fairly new addition had been the setting up of an advisory service to help companies which were starting their own information departments.

Pointed out in the discussion that followed was the difficulty of persuading the management of small firms of the necessity for spending money on information departments or libraries.

In conclusion, Sir Wallace Akers passed a vote of thanks to the organisers of the conference.

HOME

OCCA Exhibition

The fourth technical trade exhibition organised by the London Section of the Oil and Colour Chemists' Association will be held at the Borough Polytechnic, Borough Road, London, S.E.1, on Monday, Tuesday and Wednesday, 7, 8 and 9 April. The official opening will take place at 3 p.m. on the Wednesday, the president of the OCCA, Mr. L. O. Kekwick, B.Sc., F.R.I.C., officiating. The exhibition is on a much larger scale this year and will occupy three halls, there being 44 exhibitors. The London Section Committee extend a cordial invitation to all those interested to visit the exhibition.

Institute of Fuel Meeting

The annual corporate meeting of The Institute of Fuel will be held at 4.30 p.m. on Wednesday, 23 April, in the Lecture Hall of The Institution of Mechanical Engineers, Storey's Gate, London, S.W.1. This will be followed at 5.30 p.m. by the presidential address of Dr. G. E. Foxwell entitled 'Fuel Technology and Civilisation'. The annual luncheon will be held on Thursday, 24 April, at 12.30 for 1 p.m. at the Connaught Rooms, Great Queen Street, London, W.C.2, when the principal guest and speaker will be Sir John Hacking, president of The Institution of Electrical Engineers.

Magnesium Committee

The Magnesium Advisory Committee, formed recently by companies in the industry, announces the resignation from its membership of Magnal Products Ltd. It is also stated by the directors of Essex Aero Ltd., of Gravesend, which claims to produce over 90 per cent of the total United Kingdom output of rolled and strip magnesium, and is also responsible for a large production of castings, that it has decided to remain outside the new association.

Industrial Production

January indices of industrial production as compiled by the London and Cambridge Economic Service showed a figure of 137 for the chemical and allied trades. This was the same as the average figure for 1951, compared against an average of 100 for 1946.

Symposium Extended

The symposium to be held on Tuesday, 1 April, by the Institution of Chemical Engineers has been extended and will commence at 2.30 p.m. instead of 5.30 as originally planned. The subject is 'Simplification in Stainless Steel Specifications' and various speakers will express views of the steel maker, the foundry man, the maker of semi-finished products, the fabricator and the user. The final paper will be on substitute stainless steels. Dr. F. A. Freeth will be in the chair.

Polarography Meeting

The 36th ordinary general meeting of the Physical Methods Group of the Society of Public Analysts and Other Analytical Chemists will be held at Burlington House, Piccadilly, London, W.1, at 6.30 p.m. on Tuesday, 8 April. The meeting has been arranged by the Polarographic Discussion Panel and the following papers will be given: 'The Measurement of Diffusion Current with special reference to the Tinsley Pen-recording Polarograph', by W. Furness; 'Hypochlorites and the Dropping Mercury Electrode', by E. N. Jenkins; and 'Polarographic Determination of Tellurium in Selenium', by G. Osborn and J. Cobb.

Chemical Exports Maintained

Value of chemicals, drugs, dyes, and colours exported in February, although slightly lower than in January, were again over £13,000,000, the total being nearly £3,500,000 more than February, 1951, and nearly twice as great as the value of exports in the same month of 1950. Trade with the Commonwealth was well maintained, notable increases compared with February, 1951, being Australia and South Africa. There was a slight decrease of trade in the U.S. markets as against the previous month.

New Distillation Unit

William Briggs & Sons, Ltd., of Dundee, are expanding and improving their production scope, it is reported. A new distillation unit for processing Venezualan crude is being erected, and when completed will substantially improve the capacity of the Dundee refinery. The main fractionating tower is 81 ft. long (with an inside diameter of 5 ft.), and weighs 13 tons.

OVERSEAS

Reactivity of Solids Symposium

The Royal Swedish Academy and the Chalmers' Technical University are organising an international symposium in Göteborg from 13 June, 1952, to discuss the problems of the reactivity of solids. The address of the information bureau is: Symposium 1952, Royal Academy of Science, Box 5073, Stockholm 5.

Steel Industry in Australia?

Research undertaken by a German metallurgist, Dr. Ernst Pohl, may enable Western Australia to set up its own iron and steel industry. The state has only low-grade coal deposits of any size, although it has ample supplies of iron ore. Dr. Pohl's research has made it a practical possibility for the low-grade coal available in the Collie coal field to be used for steel and pig iron production, using similar techniques as have been evolved in Germany.

Bulk Bitumen for West Africa

The first bulk bitumen reception facilities came into service on 15 March when the tanker *Mexphalte* unloaded her 2,400 tons of hot bitumen into a large heated storage tank newly installed on the quay at Dakar, Senegal. For a long time France and French North Africa have benefited from a complete bulk bitumen distribution scheme. The extension of this method of distribution to French West Africa is a logical step forward in the Shell Group's programme for the extension of bulk distribution, and follows the recent opening of large bulk depots in Denmark, Portugal and Ireland.

New Indian Oil Refinery

The Burmah-Shell Oil Storage Company of India announced on 17 March that a company will shortly be registered in India to run a proposed refinery at Trombay, near Bombay. It will be known as Burmah-Shell Refineries Ltd., with a capital of Rs. 250,000,000, and will first be incorporated as a private concern, but converted into a public company when construction of the refinery is well under way. The refinery is one of three it is intended to establish in India.

First Honorary Degrees

The first honorary degrees of the New South Wales University of Technology were recently conferred on Lord Nuffield, Professor Oliphant and on the Chancellor of Sydney University, Sir Charles Bickerton Blackburn. Degrees were also conferred on 56 graduates of the new university. The ceremony was attended by the governor, Sir John Northcott.

Plastics Colloquium

A 'Colloquium on Polymers' will be held in Strasbourg from 9-12 June, 1952, which will be under the direction of Professor Dr. H. Mark, New York, sponsored by the Commission on Macromolecules of the International Union of Pure and Applied Chemistry.

Atomic Energy Company

Nine directors for the newly formed Crown company, Atomic Energy of Canada Ltd., have been named by the Canadian Government. Dr. C. J. Mackenzie, who is also president of the Atomic Energy Control Board, is relinquishing the presidency of the National Research Council to become president of the new company. The directors named include four representatives of concerns producing electric power, indicating that non-Government interests will have a voice in plans to harness the atom for industrial power purposes. The new company has been formed to direct Canada's atomic programme and will administer the atomic energy plant at Chalk River now operated by the National Research Council.

Gas Well Explosion

The methane gas well at Bordolano in the Po Valley, claimed to be the largest in Europe, exploded a few minutes before midnight on 21 March. Flames, which at first shot into the air to a height of 60 metres, were visible from five cities between Cremona and Padua. It was stated that the only expert on burning wells available was an American who had been asked to fly over to deal with this fire, the biggest yet experienced in an Italian well.

PERSONAL

Chemical research in various fields was well represented by the 25 men and two women who were elected Fellows of the Royal Society at its annual March election meeting held in London on 20 March.

The list included the following:—

SIR WALLACE ALAN AKERS, C.B.E., director, Imperial Chemical Industries Ltd. Distinguished for his technical direction of the atomic energy project during the war and for the building of large research departments and plants in Imperial Chemical Industries Ltd.

CECIL EDWARD HENRY BAWN, Grant-Brunner Professor of Inorganic and Physical Chemistry, Liverpool University. Distinguished for his researches on chemical kinetics, especially on the mechanism of polymerisation, oxidation and hydrocarbon free radical reactions.

DALZIEL LLEWELLYN HAMMICK, Aldrichian Praelector in Chemistry, Oxford University. Distinguished for his work in physical chemistry, especially in the application of physical methods in the study of organic chemical reactions.

RUDOLF LEMBERG, director, Biochemical Department of the Institute of Medical Research, Royal North Shore Hospital, Sydney. Distinguished for his contribution to the study of the metabolism of pigments derived from haemoglobin. He has initiated new botanical researches through his discovery of pigments of the bile type in plants.

FRANK STUART SPRING, Professor of Organic Chemistry in the Royal Technical College, Glasgow.

EDWARD WILFRED TAYLOR, C.B.E., joint managing director of Cooke, Troughton & Simms Ltd. Distinguished for his contributions to the development of optical instruments used in surveying and phase-contrast microscopy.

MARTHE VOGT, Lecturer in Pharmacology, University of Edinburgh. Distinguished for her work on the quantitative estimation of the cortical hormone in adrenal venous blood, and for her discovery of the various factors which control the output of this hormone.

DONALD DEVEREUX WOODS, Reader in Microbiology, Oxford University. Distinguished for his contributions to bacterial chemistry.

The following staff changes have been announced by Richard Sutcliffe Ltd., of Wakefield: MR. J. S. EXLEY, formerly publicity manager, has been appointed continental representative, MR. V. QUAINTRELL, becomes chief buyer, and MR. P. WOODWARD, publicity manager.

MR. PHILIP L. WRIGHT, managing director of the Bleachers' Association Ltd., Manchester, has been elected chairman of the company in succession to the late Mr. R. C. Reynolds.

MR. ERNEST BELCHER has been appointed a director and sales manager of Ransome & Marles Bearing Co., Ltd., Newark-on-Trent, and MR. J. B. SAMSON has been appointed a director and works manager.

Obituary

MR. CHRISTOPHER SKINNER, a director of Messrs. Gent & Co., Ltd., Faraday Works, Leicester, died on 6 March, aged 84. Mr. Skinner joined the company in 1900 and was for many years well-known throughout the trade as the sales representative for the Midlands area and subsequently as sales director. He relinquished this position some years ago but retained a seat on the board. His son, Mr. Harold Skinner, is manager of the company's Newcastle branch.

Alchemy and Art

The influence of alchemy on the thought and art of the Middle Ages was described by Professor J. Read, of the chair of chemistry, University of St. Andrews, in his address on 'Alchemy and Art' delivered at the Royal Institution, London, on Friday evening, 14 March. Alchemical symbolism, said the professor, often found an expression in decorative architecture, in stone and in coloured glass, as well as in engraving and painting.

Publications & Announcements

THE third edition of 'World List of Scientific Periodicals' is being published by Butterworths Scientific Publications and is due to appear in July of this year. After a lapse of 20 years, librarians, editors and research workers in all fields of science will welcome this useful work of reference. In 1933 the second edition listed 36,000 journals but the new edition lists over 50,000. There has also been considerable change in the number of libraries filing the periodicals and the third edition lists the holdings of 250 libraries.

* * *

A NEW technical bulletin on six Nonisols—nonionic surface-active agents of the polyoxyalkylene fatty ester type—has been published by the Alrose Chemical Company, Box 1294, Providence, Rhode Island, U.S.A. They are all substantially 100 per cent active oils or soft waxes and the group contains excellent emulsifiers and interfacial tension depressants, spreading agents, dispersants and detergents, thickeners, plasticisers, wetting agents and stabilisers. They are indifferent foamers. The Nonisols are all light coloured, bland in odour and taste and are all either soluble or dispersible in cold water. They are compatible with either anionic or cationic materials and may often be combined advantageously with these. Suggestions are given in the bulletin for uses in agriculture, metal processing, the manufacture of plasticisers in polymer dispersions, starch stabilisation, and in the textile, paint, oil, cosmetic and pharmaceutical industries. It can be had free of charge on application to Alrose Chemical Company.

* * *

THE third number of Volume 1 of *Vacuum*, the review of vacuum research published by W. Edwards & Co., of London, has recently appeared. It is dated July, 1951, as publication delays unavoidably incurred at the beginning of the volume have not been overtaken as rapidly as had been hoped. Contents of this issue include articles by well-known contributors on high-vacuum technique in nuclear physics, vacuum metallurgy, and vacuum-powder insulation for low temperatures, as well as letters to the Editor on heating *in vacuo* by an external radiation source, and evaporation of silica.

POLYTAINERS, now well-known products of Industrial Appliances, Ltd., have recently acquired two new adjuncts. Both caps, the first is a side-spray that can be used to give a fine diffused, mist-like spray which spreads the liquid in the 'polytainer' evenly, and the second is a spout-cap which is directional and enables liquids to be sprayed without waste. Both are expected to find applications in the hairdressing trade and for domestic, toilet, and industrial purposes.

* * *

THE Petroleum Information Bureau have announced that they have available certain literature and film material concerning the subject of petroleum—the multitude of products obtained from it, apart from fuels and lubricants, as well as the activities of the industry which produces them. These factual memoranda are available free of charge. The visual aids are obtainable on loan for agreed dates and consist at the moment of 150 sound and silent films—16 mm. and 35 mm.; film strips (35 mm.) for use in a filmstrip projector only; epidiascope photographs and lantern slides; sets of samples of crude oil and products, specimen cores from Eakring (Notts) oil wells and specimens of Scottish oil shale; and display material comprising photographs, picture sets of 15 coloured panels, and two cabinets explaining some of the ways in which petroleum enters everyday life in the home and industry. Wall charts and a map of world oil-producing areas complete the series. The literature and visual aids contain no advertising matter and may be obtained from the Bureau at 29 New Bond Street, London. W.1. Telephone REGent 6308.

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VOLUME 33, No. 4 (Section B) of the New Zealand Journal of Science and Technology, published by the New Zealand Department of Scientific and Industrial Research, is now available. This section covers general research and includes interesting articles on the extraction and purification of perloline—the alkaloid in ryegrass; the rocks of the North Auckland Peninsula considered as potential aquifers; and an investigation of the corrosive effects of soil on steel plates. It can be obtained (price 2s.) from the DSIR. Wellington, New Zealand.

Next Week's Events

MONDAY 31 MARCH

Incorporated Plant Engineers
Leeds: The University, 7.30 p.m. Annual General Meeting of West and East Yorkshire Branch.

TUESDAY 1 APRIL

Institution of Chemical Engineers
London: Geological Society, Burlington House, W.1, 2.30 p.m. 'Symposium on Simplification in Stainless Steel Specifications'.

SCI Agriculture Group
London: Chemical Society, Burlington House, W.1, 5.30 p.m. Crop Protection Panel—Annual General Meeting. Dr. D. L. Gunn: 'Locusts'.

Institute of Packaging
Birmingham: Imperial House, 6.30 p.m. National Annual General Meeting and Midland Area Annual Dinner.

Incorporated Plant Engineers
London: Royal Society of Arts, John Adam Street, Adelphi, W.C.2, 7 p.m. A. G. Howell: 'General Electrical Installations in Small Factories'.

The Textile Institute
Bradford: Midland Hotel, 7.15 p.m. Annual General Meeting of the Yorkshire Section.

Northampton Polytechnic
London: St. John Street, E.C.1, 7 p.m. Fourth in a course of Lectures on 'Liquid Fuels, Their Properties and Utilisation,' by G. F. J. Murray—'Applications of Liquid Fuels, Their Use in Central Heating Plants and Large Steam-raising Plant.'

WEDNESDAY 2 APRIL

Society of Public Analysts
London: Chemical Society, Burlington House, W.1, 7 p.m. Ordinary meeting.

THURSDAY 3 APRIL

The Fertiliser Society
Edinburgh: North British Hotel, 2.30 p.m. J. P. A. Macdonald: 'Some Aspects of Mechanical Handling in the Fertiliser Industry'.

Institute of Metals
Birmingham: James Watt Memorial Institute, Great Charles Street, 7 p.m. Annual General Meeting of Birmingham Local Section.

London: 4 Grosvenor Gardens, S.W.1, 7 p.m. Annual General Meeting of London Local Section: Discussion on 'Grain Refining'.

Institute of Packaging
London: Waldorf Hotel, W.C.2, 6 p.m. J. S. McGill: 'An Objective Approach to Packaging'.

The Textile Institute
Manchester: 10 Blackfriars Street, 6.30 p.m. Annual General Meeting of the Lancashire Section.

The Physical Society
London: Imperial College. Opening of Physical Society Exhibition.

FRIDAY 4 APRIL

Institute of Fuel
Carlisle: County Hotel, 7 p.m. R. F. W. Guy: 'Stokers and Fuel Handling Equipment for Shell Type Boilers'.

Society of Chemical Industry
Manchester: Engineers' Club, Albert Square, 6 p.m. Annual General Meeting. Followed by two papers: 'The Use of Polycyclic Compounds as New Starting Materials for Dyestuffs Synthesis with particular reference to Pyrene, Chrysene and Fluoranthene' and 'The Accelerated Oxidation of Drying Oils'.

Society of Glass Technology
St. Helens: Gas Showrooms, Radiant House, 6 p.m. T. S. Busby: 'Tank Block Problems'.

The Textile Institute
Dublin: Mansion House, 7.30 p.m. Annual General Meeting of Dublin Section.

Hilger and Watts, Ltd.

A number of important new instruments were put into production and others were in the course of development, it was announced by the chairman, Mr. G. A. Whipple, in his statement at the fourth annual general meeting of Hilger & Watts Ltd. (Scientific Instrument Makers), held in London on 20 March. Work on the new factory progressed steadily and limited production was scheduled to begin in July. Scientific Exports, an associate company, would shortly be sending three specially trained university graduates to strengthen its technical staff in Canada. Trading surplus amounted to £162,006, an increase of £16,478 over the previous year.

All-Canadian Project

Importance of Edmonton Plant

A NUMBER of synthetic organic chemicals not at present produced in Canada, are likely to be in production by next year at the $54,000,000 plant at Edmonton, Alberta, of Canadian Chemicals Ltd., a subsidiary of the Celanese Corporation of America.

One of the most important chemicals, according to John D. Fennebresque, general manager of the Celanese Corporation's chemical division, was pentaerythritol—PE—which was a replacement for glycerine and was at present in short supply.

Factory Unique

The Edmonton plant, according to Mr. Fennebresque, would be the only one in the world making PE with all the raw materials produced on the spot. This would ensure continuity of supply of a product which might well be vital in the event of war. All other plants producing it were situated on the vulnerable U.S.A. Eastern seaboard.

Canada at present imported some 3,000,000 lb. of PE annually. When the Edmonton plant came into operation, however, it would produce enough for her domestic requirements as well as a surplus for export to the U.S.A. and abroad.

It was thought that the availability of PE might well encourage other industries dependent on it to develop in Canada.

Celanese Corporation hopes to make operation of the Edmonton plant an all-Canadian proposition. Some 1,000 university men have been interviewed from coast to coast, and a first group of 15 are on their way to the firm's U.S. plants for four or six months' training.

'We are well satisfied with the high calibre of the Canadian personnel who qualified for jobs', said Mr. Fennebresque. Of those chosen, some were just out of university, others had up to ten years' experience.

Encouragement Offered

The New York head office of the corporation recently sent out a letter to top executives of some 5,000 firms in chemical and allied industries in the U.S.A. outlining the company's Canadian programme. The idea was that some of these firms might want to adjust their own plans to Canadian developments and perhaps establish Canadian branch factories.

Combating Pests & Weeds

PROBLEMS caused by the application of toxic substances to agricultural and horticultural purposes were discussed at a conference held in Wolverhampton on 13 March on methods of combating weeds, pests, and diseases of plants.

Dr. E. Holmes, in an introductory communication, said that, as a result of deliberations of the Zuckerman working party, emphasis was being placed on the finding of insecticides, fungicides, and weed killers that were less dangerous to mammals than many now in use.

Queries had been raised as to why firms persisted in working among the so-called dangerous chemicals. At present the most valuable phosphorus insecticides were very dangerous. It was, however, also true that a large number of phosphorus chemicals were not dangerous, and it had already been established that the mode of action of some phosphorus compounds was quite different in insects and the higher animals.

Valuable work on insect physiology was being done at Cambridge by Dr. V. B. Wigglesworth and the best thing the official research stations could do was to help to intensify such investigations.

By this means a wider background would be provided against which the chemists could plan their work more intelligently. These points had already been brought to the attention of the Agricultural Research Council.

Two New British Standards

THE British Standards Institution has just issued two further standards in the series for solvents and allied products. British Standards for these materials were not included in the original series of standards for solvents, but the greatly increased demand for materials of reliable quality for a variety of industrial uses, now justifies their inclusion.

Both standards cover specific gravity and distillation range and include a limit for acidity and descriptions of sampling and test methods. In addition, B.S. 1834 includes limits for residue on evaporation, water and ester content, and B.S. 1835 includes limits for ash and aldehydes.

Copies of the above standards can be obtained from the British Standards Institution, Sales Branch, 24 Victoria Street, London, S.W.1, price 2s. each, post free.

British Chemical Prices

LONDON.—A moderate increase in the volume of inquiry and a steady price position have been reported on the chemicals market during the past week. Contract deliveries to the main consuming industries have continued on a good scale and an active movement is reported for most of the potash and soda products. The call for the lead compounds on the lower prices now ruling has been at about recent levels. The coal tar product market is perhaps a little less active although for some items, such as pyridine, existing commitments are able to take care of available supplies. Interest in phenol crystals, creosote oil and pitch remains steady.

MANCHESTER.—Taking the Manchester chemical market as a whole there has been a fair movement of supplies under contracts during the past week, though the quantities taken up by the cotton and other branches of the textile trade continue on a reduced scale. So far as new business is concerned, a quietly steady flow of replacement buying on home-trade account has been reported, with fair activity experienced with regard to exports. Values are held pretty well throughout the range. With regard to fertilisers, there is a fair movement of the phosphatic and other descriptions. In the tar products market a steady demand is reported for most lines, though in one or two instances the pressure of supplies is not so keen as it was a month or so ago.

GLASGOW.—The uplift in trade experienced towards the end of last week has not been maintained, and with little or no demand from the textile industry, the period generally has been a quiet one. Naturally, interest in agricultural chemicals is increasing, and proving a very welcome fillip. Generally speaking, the export trade has followed the usual pattern.

General Chemicals

Acetic Acid.—Per ton : 80% technical, 1 ton, £110 ; 80% pure, 1 ton, £116 ; commercial glacial 1 ton, £130 ; delivered buyers' premises in returnable barrels ; in glass carboys, £7 ; demijohns, £11 extra.

Acetic Anhydride.—Ton lots d/d, £166 per ton.

Acetone.—Small lots : 5 gal. drums, £145 per ton ; 10 gal. drums, £135 per ton. In 40/50 gal. drums less than 1 ton, £115 per ton ; 1 to 9 tons, £114 per ton ; 10 to 49 tons, to £113 per ton ; 50 tons and over, £112 per ton.

Alcohol, Industrial Absolute.—50,000 gal. lots, d/d, 4s. 7½d. per proof gallon ; 5000 gal. lots, d/d, 4s. 8½d. per proof gal.

Alcohol, Diacetone.—Small lots : 5 gal. drums, £204 per ton ; 10 gal. drums, £194 per ton. In 40/45 gal. drums : less than 1 ton, £174 per ton ; 1 to 9 tons, £173 per ton ; 10 to 50 tons, £172 per ton ; 50 to 100 tons, £171 per ton ; 100 tons and over, £170 per ton.

Allyl Alcohol.—Less than 40 gals., 3s. 10½d. per lb. ; 40 gal., 3s. 6½d. per lb. ; 2 to 5 40 gal. drums, 3s. 4½d. per lb. ; 1 ton and over, 3s. 2½d. per lb.

Alum.—Loose lump, £17 per ton, f.o.r. MANCHESTER : Ground, £17 10s.

Aluminium Sulphate.—Ex works, £11 10s. per ton d/d. MANCHESTER : £11 10s.

Ammonia, Anhydrous.—1s. 9d. to 2s. 3d. per lb.

Ammonium Bicarbonate.—2 cwt. non-returnable drums ; 1 ton lots £47 per ton.

Ammonium Chloride. — Grey galvanising, £31 5s. per ton, in casks, ex wharf. Fine white 98%, £23 12s. 6d. to £26 5s. per ton. See also Salammoniac.

Ammonium Nitrate.—D/d, £18 to £20 per ton.

Ammonium Persulphate. — MANCHESTER : £6 2s. 6d. per cwt. d/d.

Ammonium Phosphate.—Mono- and di-, ton lots, d/d, £93 and £91 10s. per ton.

Antimony Sulphide.—Golden, d/d in 5 cwt. lots as to grade, etc., 2s. 6½d. to 3s. 7½d. per lb. Crimson, 4s. to 5s. 4½d. per lb.

Arsenic.—Per ton, £59 10s. nominal, ex store.

Barium Carbonate.—Precip., d/d ; 2-ton lots, £35 5s. per ton, bag packing.

Barium Chloride.—£44 10s. 2 ton lots d/d bags.

Barium Sulphate (Dry Blanc Fixe).—Precip., 4-ton lots, £41 per ton d/d ; 2-ton lots, £41 5s. per ton d/d.

Bleaching Powder.—£21 per ton in casks (1 ton lots).

Borax.—Per ton for ton lots, in free 140-lb. bags, carriage paid: Anhydrous, £59 10s. ; in 1-cwt. bags; commercial, granular, £38 10s. ; crystal, £42 ; powder, £43 ; extra fine powder, £44 ; B.P., granular, £48 10s. ; crystal, £51 ; powder, £52 ; extra fine powder £53.

Boric Acid.—Per ton for ton lots in free 1-cwt. bags, carriage paid : Commercial, granular, £68 ; crystal, £76 ; powder, £73 10s. ; extra fine powder, £75 10s. ; B.P., granular, £81 ; crystal, £88 ; powder, £85 10s. ; extra fine powder, £87 10s.

Butyl Acetate BSS.—£224 per ton, in 10-ton lots.

Butyl Alcohol BSS.—£206 per ton, in 10-ton lots. 10 to 49 tons £188 per ton.

***sec.* Butyl Alcohol.**—5 gal. drums £189 ; 40/45 gal drums : less than 1 ton £169 per ton ; 1 to 10 tons £168 per ton ; 100 tons and over £165 per ton.

***tert.* Butyl Alcohol.**—5 gal. drums £195 10s. per ton ; 40/45 gal. drums : less than 1 ton £175 10s. per ton ; 1 to 5 tons £174 10s. per ton ; 5 to 10 tons, £173 10s. ; 10 tons and over £172 10s.

Calcium Chloride.—70/72% solid £9 12s. 6d. per ton, in 4-ton lots.

Chlorine, Liquid.—£28 10s. per ton d/d in 16/17-cwt. drums (3-drum lots).

Chromic Acid.—2s. 0½d. to 2s. 0¾d. per lb., less 2½%, d/d U.K.

Citric Acid.—1 cwt. lots, 218s. cwt. 5 cwt. lots, 213s. cwt.

Cobalt Oxide.— Black, delivered, 13s. per lb.

Copper Carbonate. — MANCHESTER : 2s. 8d. per lb.

Copper Sulphate.—£107 17s. 6d. per ton f.o.b., less 2%, in 2-cwt. bags.

Cream of Tartar.—100%, per cwt., about £11 12s. d/d.

Ethyl Acetate.—10 tons and upwards, d/d, £174 per ton.

Formaldehyde.—£33 15s. per ton in casks, according to quantity, d/d.

Formic Acid.—85%, £82 5s. in 4-ton lots, carriage paid.

Glycerine.—Chemically pure, double distilled 1,260 s.g. £14 19s. per cwt.
Refined pale straw industrial, 5s. per cwt. less than chemically pure.

Hydrochloric Acid.—Spot, 12s. to 16s. per carboy d/d, according to purity, strength and locality.

Hydrofluoric Acid.—59/60%, about 1s. to 1s. 2d. per lb.

Hydrogen Peroxide.—27.5% wt. £124 10s. per ton. 35% wt. £156 per ton d/d. Carboys extra and returnable.

Iodine.—Resublimed B.P., 21s. 3d. per lb. in cwt. lots.

Iodoform.—25s. 4d. per lb. in cwt. lots.

Lactic Acid.—Pale tech., 44 per cent by weight £122 per ton ; dark tech., 44 per cent by weight £87 per ton ex works ; Usual container terms.

Lead Acetate.—White : £185 10s. per ton.

Lead Nitrate.—£142 per ton.

Lead, Red.—Basis prices per ton : Genuine dry red lead, £183 10s. ; orange lead, £195 10s. Ground in oil : red, £206 ; orange, £218.

Lead, White.—Basis prices : Dry English, in 8-cwt. casks, £191 per ton. Ground in oil : English, under 2 tons, £209.

Lime Acetate.—Brown, ton lots, d/d, £30 to £34 per ton ; grey, 80-82%, ton lots, d/d, £34 to £39 per ton.

Litharge.—£183 10s. per ton.

Magnesite.—Calcined, in bags, ex works, £27.

Magnesium Carbonate.—Light, commercial, d/d, £87 15s. ; cwt. lots £97 10s. per ton d/d.

Magnesium Chloride.—Solid (ex wharf), £15 per ton.

Magnesium Oxide.—Light, commercial, d/d, £221 ; cwt. lots £227 10s. per ton d/d.

Magnesium Sulphate.—£12 to £14 per ton.

Mercuric Chloride.—20s. 1d. per. lb. in 28 lb. lots ; smaller quantities dearer.

Mercury Sulphide, Red.—Per lb., from 10s. 3d. for ton lots and over to 10s. 7d. for lots of 7 to under 30 lb.

Methanol.—Pure synthetic, d/d, £28 to £38 per ton.

Methylated Spirit.—Industrial 66° O.P. 100 gals., 7s. 10d. per gal. ; pyridinised 64° O.P. 100 gal., 7s. 11½d. per gal.

Methyl Ethyl Ketone.—5 gal. drums, £179 per ton ; in 40-45 gal. drums, less than 1 ton, £159 per ton ; 50 to 100 tons, £156 per ton ; 100 tons and over, £155 per ton.

Methyl *iso*Butyl Ketone.—5 gal. drums, £219 per ton ; in 40-45 gal. drums, less than 1 ton, £199 per ton ; 50 to 100 tons, £196 per ton ; 100 tons and over, £195 per ton.

Nickel Sulphate.—Deld. buyers U.K. £140 10s. per ton.

Nitric Acid.—£35 to £40 per ton, ex works.

Oxalic Acid.—About £181 per ton, packed in 5-cwt. lots, packed in free 5-cwt. casks.

Phosphoric Acid.—Technical (S.G. 1.500), ton lots, carriage paid, £71 10s. per ton ; B.P. (S.G. 1.750), ton lots, carriage paid, 1s. 3½d. per lb.

Potash, Caustic.—Solid, £98 10s. per ton for 1-ton lots ; Liquid, £37 15s.

Potassium Bichromate.—Crystals and granular, 11½d. per lb. ; ground, 1s. 0½d. per lb., standard quantities.

Potassium Carbonate.—Calcined, 98/100%, £116 per ton for 1-ton lots, ex store.

Potassium Chloride.—Industrial, 96%, 6-ton lots, £20 to £22 per ton.

Potassium Iodide.—B.P., 18s. 7d. per lb. in 28 lb. lots.

Potassium Nitrate.—Small granular crystals, 81s. per cwt. ex store, according to quantity.

Potassium Permanganate.—B.P., 1s. 7½d. per lb. for 1-cwt. lots ; for 3 cwt. and upwards, 1s. 6½d. per lb. ; technical, £8 3s. per cwt. ; for 5 cwt. lots.

***iso*Propyl Alcohol.**—Small lots : 5 gal. drums, £156 per ton ; 10 gal. drums, £146 per ton ; in 40-45 gal. drums : less than 1 ton, £126 per ton ; 1 to 9 tons, £125 per ton ; 10 to 50 tons, £124 per ton ; 50 to 100 tons, £123 per ton ; 100 tons and over, £122 per ton.

Salammoniac.—Dog-tooth crystals, £72 10s. per ton ; medium, £67 10s. per ton ; fine white crystals, £21 10s. to £22 10s. per ton, in casks.

Salicylic Acid. — MANCHESTER : Technical 2s. 5d. to 2s. 7d. per lb. d/d.

Soda Ash.—58% ex depôt or d/d, London station, £8 17s. 3d. to £10 14s. 6d. per ton.

Soda, Caustic.—Solid 76/77% ; spot, £23 5s. per ton d/d. (4 ton lots).

Sodium Acetate.—£85 to £91 per ton d/d.

Sodium Bicarbonate.—Refined, spot, £12 7s. 6d. per ton, in bags.

Sodium Bichromate.—Crystals, cake and powder, 9¾d. per lb. ; anhydrous, 11¼d. per lb., net, d/d U.K. in 7-8 cwt. casks.

Sodium Bisulphite.—Powder, 60/62%, £40 per ton d/d in 2-ton lots for home trade.

Sodium Carbonate Monohydrate.—£25 per ton d/d in minimum ton lots in 2-cwt. free bags.

Sodium Chlorate.—£87 to £95 per ton.

Sodium Cyanide.—100% basis, 8d. to 9d. per lb.

Sodium Fluoride.—D/d, £4 10s. per cwt.

Sodium Hyposulphite.—Pea crystals £28 a ton ; commercial, 1-ton lots, £26 per ton carriage paid.

Sodium Iodide.—B.P., 20s. 1d. per lb., in 28 lb. lots.

Sodium Metaphosphate (Calgon).—Flaked, loose in metal drums, £123 ton.

Sodium Metasilicate.—£22 15s. per ton, d/d U.K. in ton lots.

Sodium Nitrate.—Chilean Industrial, 97-98%, 6-ton lots, d/d station, £30 15s. per ton.

Sodium Nitrite.—£31 for 1 ton lots.

Sodium Percarbonate.—12½% available oxygen, £8 8s. 4½d. per cwt. in 1-cwt. drums.

Sodium Phosphate.—Per ton d/d for ton lots : Di-sodium, crystalline, £37 10s., anhydrous, £78 10s. ; tri-sodium, crystalline, £39 10s., anhydrous, £75 10s.

Sodium Prussiate.—10d. to 10½d. per lb. ex store.

Sodium Silicate.—£6 to £11 per ton.

Sodium Sulphate (Glauber's Salt).—£8 per ton d/d.

Sodium Sulphate (Salt Cake).—Unground. £6 per ton d/d station in bulk. MANCHESTER : £6 10s. per ton d/d station.

Sodium Sulphide.—Solid, 60/62%, spot. £30 per ton, d/d, in drums ; broken, £30 15s. per ton, d/d, in drums.

Sodium Sulphite.—Anhydrous, £59 per ton ; pea crystals, £37 12s. 6d. per ton d/d station in kegs ; commercial, £23 7s. 6d. per ton d/d station in bags.

Sulphur.—Per ton for 4 tons or more, ground, £25 18s. 6d. to £28 8s. according to fineness.

Tartaric Acid.—Per cwt. : 10 cwt. or more, £14 10s.

Titanium Oxide.—Comm., ton lots, d/d (56-lb. /112 lb. bags), £125 per ton.

Zinc Oxide.—Maximum price per ton for 2-ton lots, d/d ; white seal, £207 10s. ; green seal, £206 10s. ; red seal, £205.

Rubber Chemicals

Antimony Sulphide.—Golden, 2s. 5½d. to 3s. 6d. per lb. Crimson, 3s. 9d. to 5s. per lb.

Carbon Bisulphide.—£65 5s. per ton, according to quality.

Carbon Black.—6d. to 8d. per lb., according to packing.

Carbon Tetrachloride.—£69 10s. per ton.

India-rubber Substitutes.—White, 1s. 9d. to 2s. 2d. per lb. ; dark, 1s. 7¾d. to 2s. 0¾d. per lb.

Lithopone.—30%, £77 per ton.

Mineral Black.—£7 10s. to £10 per ton.

Mineral Rubber, 'Rupron.'—£20 per ton.

Sulphur Chloride.—British 48s. 6d. per cwt.; Imported £120 per ton.

Vegetable Lamp Black.—£49 per ton.

Vermilion.—Pale or deep, 15s. 6d. per lb. for 7-lb. lots.

Nitrogen Fertilisers

Ammonium Sulphate.—Per ton in 6-ton lots, d/d farmer's nearest station, £16 18s.

Compound Fertilisers.—Per ton in 6 ton lots, d/d farmer's nearest station, I.C.I. Special No. 1, £27 9s.

'Nitro-Chalk.'—£12 9s. 6d. per ton in 6-ton lots, d/d farmer's nearest station.

Sodium Nitrate.—Chilean agricultural for 6-ton lots d/d nearest station, £30 15s. per ton.

Coal-Tar Products

Benzole.—Per gal, ex works : 90's, 3s. 8½d. ; pure, 3s. 11½d. ; nitration grade, 4s. 2½d.

Carbolic Acid.—Crystals, 1s. 6d. to 1s. 8d. per lb. Crude, 60's, 8s. MANCHESTER : Crystals, 1s. 6d. to 1s. 8d. per lb., d/d crude, 5s. 9d., naked, at works.

Creosote.—Home trade, 10d. to 1s. 2d. per gal., according to quality, f.o.r. maker's works. MANCHESTER : 11d. to 1s. 3d. per gal.

Cresylic Acid.—Pale 99%, 5s. 8d. per gal. ; 99.5/100%, 5s. 10d. American, duty free, for export, 7s. 6d. to 8s. 6d. naked at works.

Naphtha.—Solvent, 90/160°, 4s. 2½d. per gal. for 1000-gal. lots ; heavy, 90/190°, 3s. 8d. per gal. for 1000-gal. lots, d/d. Drums extra : higher prices for smaller lots.

Naphthalene.—Crude, ton lots, in sellers' bags, £18 16s. 3d. to £34 per ton according to m.p. ; hot-pressed, £50 to £60 per ton, in bulk ex works ; purified crystals, £68 10s. to £79 3s. 4d. per ton.

Pitch.—Medium, soft, home trade, 130s. per ton f.o.r. suppliers' works ; export trade, 200s. per ton f.o.b. suppliers' port. MANCHESTER : £6 10s. f.o.r.

Pyridine.—90/160°, 42s. 6d. per gal. MANCHESTER : 40s. to 42s. 6d. per gal.

Toluol.—Pure, 4s. 7½d. per gal. MANCHESTER : Pure, 4s. 7½d. per gal. naked.

Xylol.—For 1000-gal. lots, 5s. 1½d. per gal., according to grade, d/d.

Intermediate and Dyes
(Prices Nominal)

***m*-Cresol 98/100%.**—3s. 9d. per lb. d/d.

***o*-Cresol 30/31° C.**—1s. 4d. per lb. d/d.

***p*-Cresol 34/35° C.**—3s. 9d. per lb. d/d.

Dichloraniline.—2s. 8½d. per lb.

Dinitrobenzene.—8½d. per lb.

Dinitrotoluene.—48/50° C., 9½d. per lb. ; 66/68° C., 1s.

***p*-Nitraniline.**—2s. 11d. per lb.

Nitrobenzene.—Spot, 5½d. per lb. in 90-gal. drums, drums extra, 1-ton lots d/d buyers' works.

Nitronaphthalene.—1s. 2d. per lb. ; P.G. 1s. 0½d. per lb.

***o*-Toluidine.**—1s. per lb., in 8/10-cwt. drums, drums extra.

***p*-Toluidine.**—2s. 2d. per lb., in casks.

***m*-Xylidine Acetate.**—4s. 5d. per lb., 100%.

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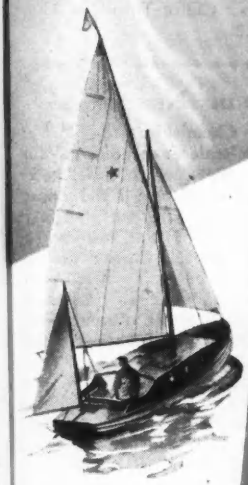

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Law & Company News

Commercial Intelligence

The following are taken from the printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described herein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages or Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

SOLARTRON LABORATORY INSTRUMENTS LTD., Kingston-upon-Thames. (M., 29/3/52). 15 February, £4,000 debentures; general charge. *£5,000. 24 August, 1951.

ORGANIC DYESTUFFS LTD., Pendleton. (M., 29/3/52). 25 February, £1,000 debenture, to Robert Hirst Senior, Salford; general charge. *£5,000. 24 August, 1951.

PETROCHEMICALS LTD., London, W. (M., 29/3/52). 20 February, £1,000,000 debenture, to Finance Corporation for Industry, Ltd.; general charge (subject to, etc.). *£6,650,000. 20 September, 1951.

GRIFFIN & TATLOCK LTD., London, W.C., scientific instrument makers. (M., 29/3/52). 20 February, £6,000 charge, to R. M. Wood, Hambledon, and another; charged on 19 Cheetham Hill Road, Strangeways, Manchester. *£56,879. 3 August, 1951.

LAVIS SERVICES LTD., Morecambe and Heysham, manufacturers of chemicals, etc. (M., 29/3/52). 25 February, £850 mortgage, to Oxley, Rushworth & Co., Ltd., Yeadon; charged on land with workshop, offices and garage thereon at White Lund, Heaton with Oxcliffe, Morecambe and Heysham. *£571. 23 April, 1951.

NORTH BRITISH ALUMINIUM CO., LTD., London, S.W. (M., 29/3/52). 18 February, disposition granted in implement of a Trust Deed dated 30 July, 1947, and supplemental deed dated 10 November, 1948, securing debenture stock of British Aluminium Co., Ltd.; charged on specified property partly in parishes of Cardross & Bonhill (Dumbarton). *Nil. 15 May, 1951.

New Registrations

Trawlskale Scientific Service, Ltd.
Private company. (505,607). Capital £5,000. Specialists in the treatment of feed water, manufacturers of boiler compositions. First directors to be appointed by subscribers. Reg. office: Tetley Works, Bolton Lane, Bradford.

M.S. Chemical Engineering, Ltd.
Private company. (505). Capital £100. Engineering and technical advisers generally to the chemical engineering trades; engineering and chemical research workers, etc. Directors: M. Steinschlaeger and A. M. Steinschlaeger. Reg. office: 116 Cannon Street, E.C.4.

Curust, Ltd.
Private company. (505,666). Capital £2,000. Manufacturers of chemicals, including anti-oxidants for organic and inorganic substances, etc. L. P. K. Oldale, M. G. O'Donnell, W. F. Newman and D. H. Brocklesby. Reg. office: 84 Grosvenor Street, W.1.

Protamin, Ltd.
Private company. (505,679). Capital £100. Manufacturers of nutritional concentrates and foodstuffs; analytical and consulting chemists, etc. First directors are not named. Solicitors: Cliffor-Turner & Co., 11 Old Jewry, E.C.2.

Company News

Monsanto Chemicals, Ltd.

Benefits of large-scale expenditures on plant and new products which have been made since the war are reflected in the report of Monsanto Chemicals Ltd., for the year ended 31 December, 1951. Consolidated trading profit at £2,889,330 showed an increase of £1,203,433 over 1950. After provision for income tax and an increased allowance for depreciation and obsolescence, consolidated net profit attributable to the group was £911,929 (£545,405). A final dividend on ordinary stock of 15 5/6 per cent is recommended making a total for the year of 22½ per cent, less tax. The annual general meeting will be at Winchester House, London, E.C.2, at 11.30 a.m. on Wednesday, 14 May.

Chemical & Allied Stocks & Shares

ALTHOUGH the Budget met with general approval in the City, two factors have contributed to a down trend in stock markets. In the first place the surprise increase in the Bank rate from 2½ per cent to 4 per cent automatically put British Funds and other fixed-interest securities on a lower price and higher yield basis; and with the general increase in the yield structure of markets, industrial shares also receded in price.

Industrial shares in particular, have remained depressed, due mainly to uncertainty in regard to the new E.P.L. In the circumstances it is thought that many companies will issue official statements as to their E.P.L. standard. E.P.L. will leave little scope for higher dividends, unless (1) a company's earnings show an exceptionally good rise, or (2) if past dividends have been very conservative, and directors feel that a more liberal dividend policy is now justified.

Shares of chemical and kindred companies have moved with the general market trend and are lower on balance than a month ago. Imperial Chemical were 40s. 3d. with the new shares (20s. paid) at par. Next month the final call of 20s. 6d. on the new shares is due, and it will call for over £10,000,000, part of which will be found by investors selling some of their shareholdings in other companies.

A factor which tends to keep stock markets depressed is the fear that before long there may be a rush of new issues which may lead to selling of existing securities in order to take up new shares offered on attractive terms.

Monsanto 5s. shares have been fairly steady around 23s. on the past year's record profits and 22½ per cent dividend on the larger capital arising from the share bonus. Hardman & Holden 5s. shares changed hands around 23s. 3d., and William Blythe 3s. shares have been active around 11s. 3d. Brotherton 10s. shares marked 22s. 6d. Albright & Wilson 5s. shares were 15s. 4½d. awaiting the financial results. Fisons receded to 28s. 6d. with the general trend, Laporte Chemicals 5s. units were 8s. 6d., Eaglescliffe 5s. shares 15s. 9d. F. W. Berk 2s. 6d. shares 5s. 10½d., and Bowman Chemical 4s. shares 6s. 9d. Greeff Chemicals were 16s. 3d., Hickson & Welch 9s. 9d., J. & J. White 12s. 3d., and Pest Control 5s. shares 5s. 9d. In other directions, Boake, Roberts 5s. shares were 16s. 6d., and W. J. Bush 55s.

Shares of companies connected with plastics have been more active with British Xylonite 27s., De La Rue 30s. 4½d., Kleemann 10s. 3d., and British Industrial Plastics 2s. shares 5s. 4½d. Elsewhere, British Glue 4s. units were 11s. 6d. Shares of Bakelite Ltd. are to be dealt in on the Stock Exchange. Present capital is £750,000 in £1 Ordinary shares. The latter are to be 'split' into 10s. shares and £750,000 of reserves are to be capitalised and applied in paying up 1,500,000 new 10s. ordinary shares.

Unilever were 46s. 6d., Turner & Newall 79s. 9d., and Boots Drug 5s. shares strengthened to 19s. United Glass Bottle were 68s. 9d., and Triplex Glass 10s. shares 23s. Associated Cement moved back to 92s. 9d. Glaxo Laboratories fluctuated around 71s. 3d. on conflicting views as to the extent that future earnings may be affected by E.P.L. Oils receded but later strengthened under the lead of Shell, which were 87s. 6d. helped by the company's decision to distribute a share bonus.

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CLASSIFIED ADVERTISEMENTS

SITUATION VACANT

The engagement of persons answering these advertisements must be made through a Local Office of the Ministry of Labour or a Scheduled Employment Agency if the applicant is a man aged 18-64 inclusive, or a woman aged 18-59 inclusive, unless he or she, or the employment, is excepted from the provisions of the Notifications of Vacancies Order, 1952.

CHEMICAL MANUFACTURERS in the Home Counties invite applications from Assistant Chemists for positions in Research Laboratories. Duties will include shift operation of experimental units (42-hour week basis). Preference will be given to candidates possessing Intermediate B.Sc., but applications will be considered from unqualified assistants with experience. The Company operates a Pension Scheme. Apply **BOX NO. C.A. 3125,** THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

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Two 39 in. oscillating **HYDRO EXTRACTORS,** with rubber covered baskets 39 in. by 16½ in. deep. Three-point suspension, 4 in. outlet in monitor. Motorised 400/3/50.

Sweetland No. 12, lead-lined **FILTER CARCASE.** 12 ft. 2 in. long by 3 ft. diam., lead lining approx. 3/16 in. Connections for 36 leaves. Fitted spur and pinion op. quick closing device.

Two recessed plate type **FILTER PRESSES** by Manlove Alliott with 54 plates 36 in. sq. by 1 in. thick. Hand op. closing gear.

Unused **VERT. MIXER** by Brierley, Collier & Hartley, stainless steel lined pan 18 in. diam. by 10 in. deep. Jacketed, 15 lb. pressure. No outlet. Vert. S.S. spiral type agitator. F. and L. pulley drive.

Lead-lined M.S. **STORAGE TANK.** 35 ft. long by 9 ft. diam. Welded steel constr., lined 3/16 in./¼ in. lead sheet. Two 4-in. and one 3-in. fixed flange connections.

Three 10 Barrel " Proda Glas " vert. **TANKS.** 4 ft. 5 in. diam. by 4 ft. 9 in. deep of M.S. constr., with M.S. low pressure brine jacket and 6 in. cork lagging. almost new condition.

Two 4-cyl. **AMMONIA COMPRESSORS** by L. Sterne. Type 4W7. Each designed to develop 41 tons refrigeration at 410 r.p.m. Complete with condenser, oil separator, liquid receiver and centrifugal pump. " V " rope drive.

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ONE—Stainless Steel **" U "-shaped TROUGH TANK,** 150 gallon capacity.
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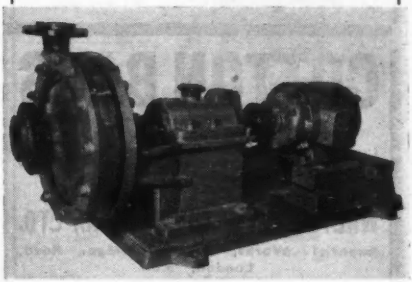

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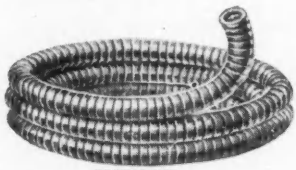

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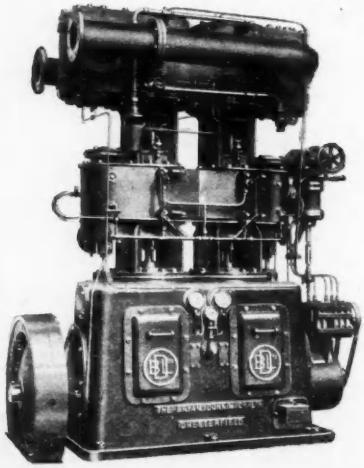

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